EXPRESS Integration Agreement Blank Book For EXPRESS Rack Payloads

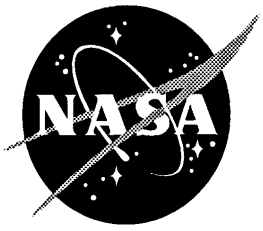
International Space Station Program

September 22, 2000

Issue A, Draft 2

Coordination Copy

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas
Contract No. NAS8-50000 (DR SE55)



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INTERNATIONAL SPACE STATION
INTEGRATION AGREEMENT BLANK BOOK
FOR EXPRESS RACK PAYLOADS

EXPEDITE THE PROCESSING OF EXPERIMENTS
TO SPACE STATION (EXPRESS) RACK PAYLOADS

DR SE55
(SSP 52000-EIA-ERP)
ISSUE A, DRAFT 2

SEPTEMBER 22, 2000

Boeing Defense & Space Group
Missiles & Space Division
(a division of The Boeing Company)
Huntsville, Alabama

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FOREWORD

INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT BLANK BOOK FOR EXPRESS RACK PAYLOADS

This document, SSP 52000-EIA-ERP, EXPRESS Integration Agreement Blank Book for EXPRESS Rack Payloads, contains the standard format that will be used by all International Space Station **(ISS)** Program ~~(ISSP)~~ participants to develop a unique EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Integration Agreement (EIA) for EXPRESS Rack payloads. The Payload Developer (PD) and the EXPRESS Payload Integration Manager (EPIM) will use this book as a blank book for the development of the unique EIA. Use of the standard format will provide a consistent definition of the required integration agreements for the payload organization and the ~~ISSP~~**ISS Program**.

This EIA Blank Book is consistent with the processes and products to be prepared by the ~~ISSP~~**ISS Program** participants, as specified in SSP 50200-01, Station Program Implementation Plan, Volume 1: Station Program Management Plan. This document is under the Configuration Management (CM) control of the International Space Station Program Payloads Control Board (PCB) and any changes or revisions will be reviewed and approved by the PCB.

_____

~~M. Suffredini~~**R. Nygren**
International Space Station Program
Payloads Office Manager

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PAYLOADS CONTROL BOARD APPROVAL NOTICE

INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT BLANK BOOK
FOR EXPRESS RACK PAYLOADS

SEPTEMBER 22, 2000

~~M. Suffredini~~**R. Nygren** Date
Chair, Payloads Control Board
National Aeronautics and Space Administration

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DOC. NO.: SSP 52000-EIA-ERP, Issue A, Draft 2

DOCUMENT RELEASE RECORD (DRR)

RELEASES (& UPDATES)	Update this document by: ACTIVE PAGES	PAGES ADDED	PAGES DELETED	AUTHORIZATIONS (& REMARKS)
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Revision A, Draft 1, 9/10/99	i thru xxiv 1-1 thru 1-~~4~~**6** 2-1 thru 2-~~4~~**6** 3-1 thru 3-~~4~~**6** 4-1 thru 4-6 5-1 thru 5-~~4~~**6** 6-1 thru 6-6 7-1 thru 7-8 8-1 thru 8-4 9-1 thru 9-4 A-i thru A-ii A-1 thru A-6 B-i thru B-ii B-1 thru B-4 C-i thru C-ii C-1 thru C-~~2~~**4** A/{IX}-i thru A/{IX}-x A/{IX}-1-1 thru A/{IX}-1-8 A/{IX}-2-1 thru A/{IX}-2-12 A/{IX}-3-1 thru A/{IX}-3-14 A/{IX}-4-1 thru A/{IX}-4-14 A/{IX}-5-1 thru A/{IX}-5-~~8~~**10** A/{IX}-6-1 thru A/{IX}-6-6 A/{IX}-7-1 thru A/{IX}-7-~~2~~**4** A/{IX}-8-1 thru A/{IX}-8-4 A/{IX}-A-i thru A/{IX}-A-ii A/{IX}-A-1 thru A/{IX}-A-4 A/{IX}-B-i thru A/{IX}-B-ii A/{IX}-B-1 thru A/{IX}-B-2 A/{IX}-C-i thru A/{IX}-C-ii A/{IX}-C-1 thru A/{IX}-C-2 A/{IX}-D-i thru A/{IX}-D-ii			DPD 681, Section 3 DR SE55. Document Rev A, Draft 1 being provided to MSFC for baselining via ECP BE01155.

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INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT
BETWEEN
INTERNATIONAL SPACE STATION PROGRAM
AND THE
{PAYLOAD NAME}

{DATE}

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INTERNATIONAL SPACE STATION PROGRAM

~~PAYLOAD~~ **EXPRESS** INTEGRATION AGREEMENT
BETWEEN
INTERNATIONAL SPACE STATION PROGRAM
AND THE
{PAYLOAD NAME}

PAYLOAD ACRONYM: {PAYLOAD ACRONYM}

PAYLOAD ID: {PAYLOAD ID}

PAYLOAD DEVELOPER: {PAYLOAD DEVELOPER}

Approved by:	~~Mike Suffredini~~**R. Nygren**	OZ
	PAYLOADS OFFICE MANAGER	ORGN
	SIGNATURE	DATE
Approved by:		
	PAYLOAD DEVELOPER REPRESENTATIVE	ORGN
	SIGNATURE	DATE

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INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT
BETWEEN
INTERNATIONAL SPACE STATION PROGRAM
AND THE
{PAYLOAD NAME}

Concurred by:	James Scheib	OZ2
	MANAGER, MISSION INTEGRATION AND PLANNING	ORGN
	SIGNATURE	DATE
Concurred by:	Dan Hartman	OZ3
	MANAGER, HARDWARE AND SOFTWARE ENGINEERING INTEGRATION AND PLANNING	ORGN
	SIGNATURE	DATE
Concurred by:	Ned Penley	OZ4
	MANAGER, RESEARCH MISSION MANAGEMENT	ORGN
	SIGNATURE	DATE
Concurred by:	Douglas Sander	OZ5
	MANAGER, UTILIZATION	ORGN
	SIGNATURE	DATE

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INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT
BETWEEN
INTERNATIONAL SPACE STATION PROGRAM
AND THE
{PAYLOAD NAME}

Concurred by:	Carole McLemore	FD31
	EXPRESS RACK EI LEAD	ORGN
	SIGNATURE	DATE
Prepared by:		2-8A1A (TBE)
	EXPRESS PAYLOAD INTEGRATION MANAGER	ORGN
	SIGNATURE	DATE

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INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT
BETWEEN
INTERNATIONAL SPACE STATION PROGRAM
AND THE
{PAYLOAD NAME}

APPROVING REPRESENTATIVES:
PAYLOADS OFFICE MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

PAYLOAD DEVELOPER PROJECT MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

RESEARCH PROGRAM OFFICE MANAGER

Name: **Office Code:**

Telephone: **Fax:**

E-Mail:

Address:

DEVELOPING REPRESENTATIVES:
EXPRESS PAYLOAD INTEGRATION MANAGER

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

PAYLOAD DEVELOPER REPRESENTATIVE

Name: Office Code:

Telephone: Fax:

E-Mail:

Address:

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PREFACE

INTERNATIONAL SPACE STATION PROGRAM

EXPRESS INTEGRATION AGREEMENT
BETWEEN
INTERNATIONAL SPACE STATION PROGRAM
AND THE
{PAYLOAD NAME}

This EXPRESS Integration Agreement (EIA) is the **Research Program Office or Appropriate Office or** Payload Developer (PD) and International Space Station **(ISS)** Program ~~(ISSP)~~ agreement on the responsibilities, tasks, and requirements which directly relate to the assignment and integration of the payload into the EXPRESS Rack on the International Space Station (ISS). The EIA further defines the roles and responsibilities, technical requirements, and integration schedules to launch, operate, and return an EXPRESS Rack payload.

*[Any instructional information contained in this ~~PIA~~ **EIA** Blank Book is italicized and enclosed in brackets [example]. Information to be supplied is underlined and enclosed in braces {example}. All instructional information will be removed for the payload-unique EIA.]* ***Specific information relative to the data input fields in PDL is enclosed by the symbols #, # example #.***

All commitments and services to be furnished by the ~~ISSP~~**ISS Program** to the Payload Developer under this EIA shall be furnished using its best efforts.

~~The flight dates shown in this EIA are for planning purposes only.~~

The abbreviations and acronyms list is found in Appendix A. The glossary of the terms requiring definition is found in Appendix B. Open items which have not been determined are designated as To Be Determined (TBD) and are found in Appendix C. Items which need to be resolved will be designated as To Be Resolved (TBR) and are also found in Appendix C. ~~Appendix D contains the Request for Resources and Accommodations Form.~~ **The Addendum documents the ~~ISSP~~ISS Program and Space Shuttle Program (SSP) services and other elements necessary to accomplish the integration, launch, on-orbit operations, descent, and deintegration of the payload**.

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LIST OF TABLES

SECTION 1, INTRODUCTION

1.1 PURPOSE

The EXPRESS Integration Agreement (EIA) is the primary management and technical agreement between the {**Research ~~Project~~Program Office or Appropriate Office or** Payload Developer (PD)} and the International Space Station **(ISS)** Program ~~(ISSP)~~. Throughout this document, the {Payload Organization} will be referred to as the **Payload Developer** (PD), and the {Payload Name} **with experiment and associated equipment** will be referred to as the payload. This document applies to all EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Rack payloads. The EIA specifies all management and technical activities required for **integration,** transportation**,** and on-orbit operation of the {Payload Name}. The EIA similarly establishes the basis by which the operation of the payload will be implemented for specific on-orbit increments.

The EIA consists of three separate parts: the main volume, the addendum, and the data sets. The main volume of the EIA describes the static requirements and the general roles and responsibilities of the parties involved in the integration/deintegration, prelaunch/post-landing processing, transportation and the on-orbit operation of the payload. More specifically, it contains information pertaining to specific reviews, schedules, hardware commitments and protocols required to manifest the payload. The addendum documents the tactical parameters, ~~dynamic requirements, schedules, and~~ commitments associated with specific transportation flights, and on-orbit increment operations. Information in the addendum will be provided **for** each increment the payload is on-orbit. Finally, the data sets contain the engineering, integration, and operational details required and agreed upon by the implementing organizations. Data sets define, on an increment and flight-specific basis, the engineering, integration, and operational details of the requirements in the addendum. Data sets will be updated, as agreed-to by the implementing organizations, to meet increment and flight-specific needs. For details of the payload integration processes, see SSP 52000-UG-ERP, Users Guide for EXPRESS Rack Payloads.

1.2 SCOPE

This EIA main volume defines management roles and responsibilities; flight and ground safety requirements; interface design requirements; verification and testing requirements; operational requirements; launch/landing site processing requirements; resource and interface commitments; and ~~a standard~~ schedule **tracking commitments**. The addendum documents the ~~ISSP~~**ISS Program** and Space Shuttle Program (SSP) services; tactical parameters; prelaunch to ascent requirements; on-orbit requirements; return requirements; training requirements; and the program-provided ground support requirements~~;~~

~~and a payload-specific schedule;~~ all on an increment and flight basis. These elements are necessary to accomplish the integration, launch, on-orbit operation, descent, and deintegration of the payload. **The data sets document payload configuration, training, ground data services, payload operations, planning, and Kennedy Space Center (KSC) technical and support requirements. A complete description of each data set is defined in SSP 52000-PDS, Payload Data Sets Blank Book.**

1.2.1 Documentation

The primary documentation required to ensure proper integration of the payload consists of the EIA, the EIA addenda, the ~~EIA~~ p**ayload** data sets, ~~and applicable~~ **the** Interface Control Document**s** (ICD)**,** ~~and~~ **the Payload** Verification Plan **(PVP), and a payload integration schedule**.

1.2.2 Approval Authority

The EIA, **payload data sets, unique ICDs,** and associated changes are to be approved jointly by the Space Station Payloads Office (SSPO) and the {**Research ~~Project~~Program Office or Appropriate Office or** Payload Developer (PD)}. The payload-unique ICD**s** and verification plans and associated changes will be approved jointly by the PD and the EXPRESS Rack Office (ERO). The **unique** payload data sets and associated changes are ~~to be approved jointly by the PD and~~ controlled by ~~the appropriate~~ Level III control boards. **The Blank Book data sets are controlled by the Payloads Control Board (PCB).**

1.2.3 Configuration Management

Configuration control **for this EIA** commences upon **the** last **required** signature of this ~~EIA~~ **document**. The ~~ISSP~~**ISS Program** will maintain configuration control of this document in accordance with SSP ~~50123~~**41170**, Configuration Management ~~Handbook~~**Requirements**.

1.2.4 Intellectual Property and Goods

Each participant to this EIA is obligated to transfer to the other any and all technical data and goods necessary to fulfill its responsibilities under this EIA, subject to the following:

A. ~~Information relevant to integration , operations, and safety, as well as documentation development, including detailed design data but excluding manufacturing, processing data, and associated software, will be exchanged without restriction as to use or~~

~~disclosure.~~ **Nothing within this EIA requires or obligates either participant to transfer proprietary technical data and goods contrary to national laws, statutes, or regulations relating to export controls or to the control of classified data.**

B. ~~In the event of transfer of proprietary technical data for which protection is to be maintained, such technical data will be adequately marked with a notice indicating that this data will be used and disclosed by the receiving Participant and its contractors and subcontractors only for the purpose of fulfilling the receiving Participant's responsibilities under this EIA. Proprietary data will not be disclosed or further distributed to any other entity without prior written permission of the originating Participant. The receiving Participant agrees to abide by the terms of the notice and to protect any such marked technical data from unauthorized use or disclosure.~~ **All payload data requested will be used exclusively for the purpose of assigning payload resources, accommodations and services as well as assessing compatibility for integration of the payload into the ISS. Proprietary data will be limited to the extent possible. Any unique handling of proprietary data will be negotiated with the ~~ISS~~PISS Program and documented in Section 3.3 of the EIA. ~~Failure to provide adequate information may result in the payload being disallowed.~~**

C. In the event there is a transfer of any technical data and goods that are protected for export control purposes, the furnishing participant will adequately mark with a notice or otherwise specifically identify all affected technical data and goods. This notice or identification will indicate that affected technical data and goods will be used by the receiving participant and its contractors and subcontractors only for the purposes of fulfilling the receiving participant's responsibilities under this EIA. The notice of identification will also provide that affected technical data will not be disclosed and such technical data and goods will not be further distributed to any entity without prior written permission of the originating participant. The participants agree to abide by the terms of the notice or identification and to protect all affected technical data and goods. **NASA, international partners, and participants will follow the technology transfer guidelines in the Intergovernmental Agreement (IGA). NASA will follow the export classification and marking process described in the NASA Export Control Program and in SSP 50223.**

D. The participants are under no obligation to protect any unmarked proprietary technical data, documentation, or other unidentified protected goods.

E. ~~Nothing within this EIA requires or obligates either Participant to transfer proprietary technical data or good contrary to national laws, statutes, or regulations relating to export controls or to the control of classified data.~~ **Information relevant to**

integration, operations, and safety, as well as documentation development, including detailed design data, but excluding manufacturing, processing data, and associated software, will be exchanged without restriction as to use or disclosure. In the event of transfer of proprietary technical data for which protection is to be maintained, such technical data will be adequately marked with a notice indicating that this data will be used and disclosed by the receiving participant and its contractors and subcontractors only for the purpose of fulfilling the receiving participant's responsibilities under this EIA. Proprietary data will not be disclosed or further distributed to any other entity without prior written permission of the originating participant. The receiving participant agrees to abide by the terms of the notice and to protect any such marked technical data from unauthorized use and disclosure.

1.3 PRECEDENCE

In the event of inconsistency among payload integration documentation contained within the applicable documents, resolution will be achieved by observing the following order of precedence:

A. Safety documents.

B. EIA main volume and addenda.

C. Payload-unique EXPRESS ICD.

D. EIA data sets.

E. EIA applicable documents other than A, B, C, and D.

1.4 PUBLIC INFORMATION

Distribution of information to the public pertaining to the payload may be made by each participant to this EIA for its own portion of the program as specified in **<TBD 1-1>** Public Affairs Plan. Insofar as participation of the other participant is involved, information may be released to the public after suitable consultation and agreement as to its content.

Certain categories of information regarding the payload, such as medical information collected from the crew and other proprietary information, is not suitable for public dissemination. ~~Information of these types will be protected by use of secure communications channels and/or the use of applicable encryption techniques as appropriate for the type of data involved.~~ **The ISS communications system is considered sufficiently secure to protect the downlink of sensitive material. Onboard, password protection may be**

desired for some information. Distribution of sensitive material following receipt by the ground via mail, fax, or electronic means will be done using appropriate data privacy measures. The PD will supply encryption equipment (flight and ground) and requirements for secure communications channels and encryption techniques if the PD determines that this level of protection of proprietary payload data is justified.

1.5 FINANCIAL ARRANGEMENTS

The cost of discharging their respective responsibilities under this EIA will be sustained by each participant involved, unless otherwise mutually agreed upon. Technical agreements contained within this EIA will be subject to the availability of appropriated funds. Should either participant encounter financing problems, that participant will notify the other participant in a timely manner.

1.6 ENTRY INTO FORCE AND DURATION

This EIA will enter into force on the date of the last signature; hereon, and will remain in force until: (1) completion of all activities under this agreement; or (2) termination by mutual agreement by all ~~Participants~~**participants**.

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SECTION 2, DOCUMENTS

2.1 APPLICABLE DOCUMENTS

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The current issue of the following documents is identified in SSP 50257, Program Controlled Document Index. The documents listed in this paragraph are applicable to the extent specified herein. Inclusion of applicable documents herein does not in any way supersede the order of precedence identified in Paragraph 1.3 of this document.

SSP 41170	**Configuration Management Requirements**
SSP 50004	**Ground Support Equipment Design Requirements**
SSP 50005	**ISS Flight Crew Integration Standard (NASA-STD-3000/T)**
~~SSP 50108~~	~~Certification of Flight Readiness Review~~
~~SSP 50123~~	~~Configuration Management Handbook~~
SSP 50200-01	Station Program Implementation Plan, Volume 1: Station Program Management Plan
SSP 50223	**Space Station and Shuttle-MIR Programs Export Control Program**
SSP 50260	International Space Station Medical Operations Requirements Document (ISS MORD)
SSP 50323	**Payload Users Development Guide (PUDG) For The Space Station Training Facility (SSTF) Payload Training Capability (PTC)**
SSP 50431	**ISS Program Requirements for Payloads *(Applicable Document Only to ISS Funded Payloads)***
SSP 50486	**Preflight Imagery Requirements per NASA-Provided ISS Government Furnished**

	Equipment
SSP 50502	**International Space Station Preflight Imagery Requirements**
SSP 50503	**International Space Station On Board Training Media Requirements**
SSP 52000-IDD-ERP	EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Rack Payloads Interface Definition Document
SSP 52000-PDS	**ISS Payload Data Sets (PDS) Blank Book**
SSP 52000-PVP-ERP	Generic Payload Verification Plan, EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Rack Payloads
~~**SSP 52000-PDS**~~	~~**ISS Payload Data Sets (PDS) Blank Book**~~
SSP 52005	ISS Payload Flight Equipment Requirements and Guidelines for Safety-Critical Structures
SSP 52054	~~**ISSP**~~**ISS Program Payloads Certification of Flight Readiness Implementation Plan**
SSP 57025	**ISS Payload Interface Systems Fault Tolerance Document**
SSP 57057	**ISS Payload Integration Template**
SSP 58026-01	**Generic Payload Simulator Requirements Document – Vol. 1**
SSP 58309/NPTIP	**NASA Payload Training Implementation Plan (NPTIP)**
SSP 58700-ANX5	**PODF Management Plan, Annex 5**
SSP 58700-ANX6	**PODF Management Plan, Annex 6: Payload Developer's Display Guide**
NSTS 1700.7	Safety Policy and Requirements for Payloads Using the Space Transportation System

NSTS/~~ISS~~ 1700.7 ISS Addendum	Safety Policy and Requirements for Payloads Using the International Space Station
NSTS 07700	Program Definition and Requirements, Volume XIV, Space Shuttle System Payload Accommodations, Appendix 5, **System Description and Design Data** - Ground Operations
NSTS 08242	Limitations for Non-Flight Materials and Equipment Used In and Around the Space Shuttle Orbiter Vehicles
NSTS/ISS 13830	**Payload Safety Review and Data Submittal Requirements for Payloads Using the - Space Shuttle - International Space Station**
NSTS 21000-IDD-MDK	Shuttle/Payload Interface Definition Document for Middeck Accommodations
JSC 20483	**~~JSC Institutional Review Board; Guidelines for Investigators Proposing,~~** Human Research for Space Flight and Related Investigations
JSC 27472	**Requirements for the Submission of Data Needed for Toxicological Assessment of Chemicals and Biologicals To Be Flown on Manned Spacecraft**
KHB 1700.7	Space Shuttle Payload Ground Safety Handbook
KHB 1710.2	**KSC Safety Practices Handbook**
NIH 85-23	Guide for the Care and Use of Laboratory Animals for Space Flight Investigations
NMI 8910.1	Care and Use of Animals in the Conduct of NASA Activities
<**TBD 1-1**>	Public Affairs Plan
~~<**TBD 3-1**>~~	~~Payload Schedule~~

{Increment-specific document number}	{List the Increment-specific Definition and Requirements Document here}
{Increment-specific Mission Integration Plan}	{List the Increment-specific Mission Integration Plan here}

[Documents may be added to this section as is necessary to support the final scope and content of this EIA.]

2.2 REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document. These reference documents may or may not be specifically cited within the text of this document.

SFOC-FL 1860	**ISS IVA Tool Catalog**
SSP 30695	**Acceptance Data Package Requirements Specification**
SSP 41158	**Software ICD Part 1 USOS to International Ground System Segment Ku-Band Telemetry Formats**
SSP 50112	**Operations Summary**
SSP 50254	**Operations Nomenclature**
SSP 50304	**POIC Capabilities Document**
SSP 50305	**POIC to Generic User Interface Definition Document**
SSP 50467	**ISS Cargo Stowage Technical Manual: Pressurized Volume**
SSP 52000-UG-ERP	Users Guide for EXPRESS Rack Payloads
SSP 52000-PAH-ERP	ISS Payload Accommodations Handbook, EXPRESS Rack Payloads
SSP 52000-PAH-KSC	KSC Payload Launch Site Processing Payload Accommodations Handbook

JSC 28533	**ISS Catalog of IVA GFE/Flight Crew Equipment**
MIL-STD-100G	**DOD Standard Practice for Engineering Drawings**
NSTS 18798	Interpretations of NSTS/ISS Payload Safety Requirements - Safety Package.
~~DoD STD 100E~~	~~Engineering, Drawing Practices~~
~~**MSFC-PLAN-2846**~~	~~**NASA Payload Training Implementation Plan (NPTIP)**~~
~~**SSP 50431**~~	~~**Payload Development Program Requirements Document**~~
<**TBD 6-3**>	User Training/Certification Plan
<**TBD 6-4**>	Ground Malfunctions Book
<**TBD 6-5**>	Payload Systems Manual
<**TBD 6-6**>	Payload Operations Handbook
<TBD 6-7>	~~Payload Regulations~~ **Payload Operations Integration Center Payload Regulations**
<TBD 6-8>	**Facility Capabilities and Requirements Document**
<TBD 6-9>	**Preflight and Post-Flight Crew Time Requirements and Facility Usage Requirements**
~~**<TBD 6-10>**~~	~~**Payload Reliability Maintainability and Quality Assurance Generic Requirements**~~
~~**<TBD 6-11>**~~	~~**JSC Building 9 Trainers**~~

[Documents may be added to this section as is necessary to support the final scope and content of this EIA.]

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SECTION 3, ~~MANAGEMENT~~ RESPONSIBILITIES ~~AGREEMENT~~

3.1 GENERAL PAYLOAD DESCRIPTION

~~The PD shall provide the following information i Table 3.1-1, Payload description.~~

~~A. Payload Description - A brief statement which describes the payload. Include in the description the total number of laocker and/or Interfantional Subrack Interface Standard (ISIS) drawers that comprise the payload.~~

~~TABLE 3.1-1 PAYLOAD DESCRIPTION~~

~~PAYLOAD DESCRIPTION~~

~~*[Expand table as required to document additional content.]*~~

{Payload Description - A brief descriptive overview of the payload flight hardware that includes a summary transportation and on-orbit scenario, as well as a summary of the intended on-orbit evolution of the hardware configuration.} # character, 500 max. #

3.2 PAYLOAD FUNCTION

~~The PD shall provide the following information in Table 3.2-1, Payload Function.~~

~~A. Payload Function(s) - A brief statement whcih describes the basic function(s) of the payload.~~

~~TABLE 3.2-1 PAYLOAD FUNCTION~~

~~PAYLOAD DESCRIPTION~~

~~*[Expand table as required to document additional content.]*~~

{Payload Function(s) - A brief statement which describes the basic function(s) of the payload.} # character, 500 max. #

3.3 RESPONSIBILITIES

The responsibility for ensuring the definition, control, implementation, and accomplishment of requirements and activities specified within this document is vested with the ~~ISSP~~**ISS Program** and for the {Payload Name} within the ~~{Payload Organization}~~ **{Research ~~Project~~Program Office or Appropriate Office or Payload Developer (PD)}**. The ~~ISSP~~**ISS Program**, as represented by the EXPRESS Payload Integration Manager (EPIM), is responsible for the integration, operation and transportation to and from the ISS as documented in this EIA. The **{Research ~~Project~~ Program Office or Appropriate Office or Payload Developer (PD)} represented by the** PD is responsible for the development**, integration,** and support of the payload. **If a PD is unable to solve a problem the EPIM should be contacted to discuss options.** The ~~ISSP~~**ISS Program** will and the PD shall staff pertinent integration activities, both analytical and physical, as identified within this EIA, and according to the templates contained in ~~Section 9 of this document~~**SSP 57057**.

3.3.1 International Space Station Program Responsibilities

The ~~ISSP~~**ISS Program** will perform the following activities:

A. Perform analytical**,** ~~and operations~~**operational, and physical** integration of the payload into the EXPRESS Rack and/or EXPRESS Transportation Rack **(ETR)**.

B. Ensure the safety of the **integrated element's** payload complement at all times, **requiring compliance with specific Safety documents (e.g., NSTS/ISS 1700.7 ISS Addendum, Safety Policy and Requirements for Payloads Using the International Space Station, etc.).**

C. Ensure that all activities, facilities, services and resources required to support launch, landing and operation for a payload are provided as specified within this EIA.

D. Provide all necessary ISS requirements, EXPRESS documents, and access to necessary ~~ISSP~~**ISS Program** databases (e.g., Payload Data Library (PDL), **Payload Information Management System (PIMS), interim User Requirements Collection/User Requirements Collection (iURC/URC ~~(iURC)~~**) to the PD within a timeframe that enables the PD to meet the commitments in this EIA.

E. Assess the contents of all relevant payload-unique documentation and engineering data to determine whether payload requirements can be met by the ISS and the appropriate launch vehicle programs and negotiate alternative solutions for requirements that cannot be satisfied.

F. Supply to the PD all pertinent ~~ISSP~~**ISS Program**-provided and launch vehicle program-provided flight hardware, verification equipment, facilities, and Ground Support Equipment (GSE) as noted in this EIA.

G. Perform **analytical and physical integration of stowed hardware as well as** physical integration and testing as documented in this EIA.

H. Provide test support for the appropriate interfaces during the installation of the payload into the **launch vehicle or** carrier and into the EXPRESS Rack on the ISS as negotiated in this EIA.

I. Assess and integrate the requirements for the Payload Operations Integration Center (POIC), Payload Data Services System (PDSS), and the appropriate International Partner (IP) equivalent ground data services. These services will include all ground data services required for user training, simulations, and on-orbit operations.

J. Coordinate with PDs to develop integrated training products and perform training of the crew and the Ground Support Personnel **(GSP)**.

K. Facilitate and manage the provision of ISS resources needed for the operation of the payload during transportation to and from orbit and while in the ISS **to include any operational constraints**.

L. Manage on-orbit payload stowage volume located **inside the payload rack(s) and** outside the payload ~~locker(s)/ISIS drawer(s)~~ **rack(s)** volume. **Manage ISS allocated stowage volume for payloads during transport to and from ISS.**

M. Perform physical de-integration of the payload from the EXPRESS Transportation Rack and/or carrier.

N. Return the payload, samples, and associated expendables from the ISS. After de-integration, ensure its availability to the PD, as specified in this EIA.

O. Provide provisions to maintain/control proprietary information on a limited need-to-know basis (e.g. toxicology data).

P. *[List other ~~ISSP~~**ISS Program** responsibilities as agreed-to by the ~~ISSP~~**ISS Program** Representative and the PD.]* ***# character, 500 max. each item #***

3.3.2 Payload Developer Responsibilities

The PD shall perform the following activities:

A. Deliver payload to the launch site as scheduled in payload integrated schedule.

B. ~~Perform overall design, development, and testing to ensure the safe operation of the payload and its associated GSE.~~ **Provide flight and ground safety certification statements to the ~~ISSP~~ISS Program as per NSTS/ISS 13830, Payload Safety Review and Data Submittal Requirements For Payloads Using the: - Space Shuttle, - International Space Station.**

C. Provide support to the ERO, ISS and appropriate transportation vehicle program analytical and physical integration activities identified within this EIA **and consistent with the CoFR process described in SSP 52054**.

D. Support, as appropriate, the structural, mechanical, materials, **acoustics, EMI/EMC,** avionics, thermal, flight planning, flight operations, ground operations, and other technical areas essential to the review and resolution of integration and operational issues.

E. Respond to ~~ISSP~~**ISS Program** requirements and provide documentation and data products according to ~~schedules set forth in this EIA and in the <**TBD 3-1**> Payloads **Integrated** Schedule document~~**negotiated payload-unique integration schedules**.

F. Verify interface compatibility for the payload and PD-provided GSE.

G. Submit applicable documentation and data for PD-provided hardware, as specified in the data sets and the payload-unique verification requirements.

H. Provide appropriate personnel to adequately support all programmatic reviews as documented in this EIA and in the ~~<**TBD 3-1**> **payload**~~**s** integrated schedule ~~document~~.

I. Provide engineering drawings ~~and photographs~~ of payload-provided hardware. **The documentation photography should show all areas of the payload where repair or service may be required and shall include photography of interface/tools. Because of potential lack of access due to payload configuration, some photographs will have to be performed at the vendor or contractor's facilities at convenient points during the payload's assembly and integration.** ~~Ensure payload hardware does not exceed the weight and center of gravity (c.g.). limitations. **The documentation photography should show all areas of the payload where repair or service may be required and shall include photography of interface/tools. Because of potential lack of access due to payload configuration, some photographs will have to be performed at the vendor or contractor's facilities at convenient points during the payload's assembly and integration.**~~

J. Develop a preflight imagery matrix documenting the imagery planned to be collected during fabrication and assembly to satisfy requirements for on-orbit maintenance, onboard training, historical documentation, operations, and procedure development. The matrix will detail the images to be recorded, and project the schedule for delivering the images and associated data to the Digital Imagery Management System for cataloguing and archiving. SSP 50486 "Preflight Imagery Requirements for NASA-Provided ISS government Furnished Equipment" (NASA payloads) and/or SSP 50502 "International Space Station Preflight Imagery Requirements" (multilateral payloads) defines the a) criteria for determining what imagery is required, b) quality and characteristics of each image, and c) the metadata required to be provided for each image. The delivery schedule for the matrix is determined on a payload-by-payload basis, but in no case will it be later than the Critical Design Review (CDR) for payload hardware.

~~J~~**K**. Provide the appropriate training, training documentation, payload simulator, and other resources to support the training requirements.

~~K~~**L**. Provide ~~logistics, maintenance and~~**reliability, maintainability, and** ~~Quality~~ **quality** ~~Assurance~~ **assurance** (**RM&**QA) ~~support to ISSP provided hardware and software to the extent agreed-to by the PD upon acceptance of the hardware and/or software.~~ **and problem reporting/tracking in accordance with SSP <~~TBD 6-10>, Payload Reliability Maintainability and Quality Assurance Generic Requirements~~50431, ISS Program Requirements for Payloads. For NASA funded payloads, the PD shall provide quality assurance and problem reporting/tracking in accordance with ISS Programs Requirements for Payloads, SSP 50431. For non-NASA funded payloads, the PD shall utilize a closed-loop system for reporting and correcting problems throughout the life cycle of the project. The PD shall meet the detailed requirements for reporting, analysis, and resolution of hardware and software in accordance with SSP 30223, Problem Reporting and Corrective Action for the Space Station Program.**

~~L~~**M**. ~~Manage the payload operations to and from orbit and within ISS in accordance with safety and allocated ISS resources.~~ **Provide engineering, integration, and operational requirements as specified in the Payload Data Sets Blank Book, SSP 52000-PDS. For NASA funded payloads, provide quality assurance and problem reporting/tracking in accordance with ISS Programs Requirements for Payloads, SSP 50431. For non-NASA funded payloads, the PD shall utilize a closed-loop system for reporting and correcting problems throughout the life cycle of the project. The PD shall meet the detailed requirements for reporting, analysis, and resolution of hardware and software in accordance with SSP**

30223, Problem Reporting and Corrective Action for the Space Station Program.

~~M~~**N**. ~~Submit changes to the payload-unique verification plan as needed to incorporate the Payloads Safety Review Panel (ground and flight) approved safety verification requirements.~~ **Archive payload analysis, test data, and inspection data required to substantiate closure of all payload verification requirements. This data must be available upon ~~ISSP~~ISS Program request.**

~~N~~**O**. *[List other PD responsibilities as agreed-to by the ~~ISSP~~**ISS Program** Representative and PD.]* **# character, 500 max. each item #**

*3.3.3 Joint (~~ISSP~~**ISS Program**/{~~Payload Developer~~ **Research Project Office or Appropriate Office**}) Responsibilities*

The ~~ISSP~~**ISS Program** and the {**Research ~~Project~~Program Office or Appropriate Office or Payload Developer** (PD)} shall perform the following activities as part of the agreed-to responsibilities:

A. Extend the best efforts of the ~~ISSP~~**ISS Program** and of the **{Research ~~Project~~Program Office or Appropriate Office or Payload Developer** (PD)} to comply with the agreements documented within this EIA.

B. Resolve, at the lowest possible management level, any disparity between specified requirements and the ability of the ~~ISSP~~**ISS Program** or **{Research ~~Project~~Program Office or Appropriate Office or Payload Developer** (PD)} to comply with them.

C. Support all required analytical, physical, and testing activities, operational and training activities, and safety reviews specified within this EIA.

D. Yield authority to the Commander of the Earth-To-Orbit Vehicle (ETOV) when action is required to ensure the safety and well-being of the crew and the transportation vehicle during all launch, pre-~~docking~~ and post-docking with the ISS, and landing phases.

E. Yield authority to the Commander of the ISS when action is required to ensure the safety and well-being of the crew, the ISS, and the attached transportation vehicle (if attached to the ISS) during all on-orbit ISS operations.

F. Notify immediately the other participant of any noncompliance of requirements which could affect safety, schedules, or mission success.

G. *[List other joint responsibilities as agreed-to by ~~ISSP~~**ISS Program** Representative and* {Research ~~Project~~ **Program** Office or Appropriate Office or Payload Developer (PD)}*]* ***# character, 500 max. each item #***

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SECTION 4, FLIGHT AND GROUND SAFETY REQUIREMENTS

4.1 GENERAL FLIGHT AND GROUND SAFETY REQUIREMENTS

A. The PD shall ensure the payload **experiment equipment**~~, the complement of associated experiments, conducted by or within the payload,~~ and GSE are safe.

B. The PD shall ensure the payload and GSE design and operations comply with the safety requirements defined ~~herein~~ in NSTS~~/ISS~~ 1700.7 ISS Addendum, KHB 1700.7 Space Shuttle Payload Ground Safety Handbook, and NSTS/ISS 13830. The ~~ISSP~~**ISS Program** will assess the payload compliance with the safety requirements through flight and ground safety reviews and safety certification. Successful completion of these safety reviews and safety certifications by the PD will result in approval by the ~~ISSP~~**ISS Program** for ground processing and flight.

C. The PD shall provide full disclosure of all operating parameters, including but not limited to pressures, temperatures, voltages, and power or loss of power to preclude a hazardous operation event from occurring during either ground or flight operations. These parameters will be made available to the POIC during flight and on-orbit operations.

D. The PD shall provide full disclosure of the contents of all substances including proprietary material used in or produced by their payload or experiment. ~~These disclosures will be made to the safety panel in the normal submittal of payload hazard reports.~~ **The PD shall submit materials to the JSC Toxicology Office in accordance with NSTS/ISS 13830 and JSC 27472, Requirements for the Submission of ~~Test Sample - Materials Data for Shuttle Payload Safety Evaluations~~Data Needed for Toxicology Assessment of Chemicals and Biologicals To Be Flown on Manned Spacecraft.**

E. The PD shall identify all on-orbit maintenance activities which are required by hazard reports. The PD shall specify a not-to-exceed date and if applicable a not- to-exceed time interval for performing each maintenance activity. The PD shall specify the time required to perform each maintenance activity. The PD shall identify all on-orbit verification activities which are required by hazard reports. The PD shall specify any constraints (e.g. tools, personnel, unique training) for performing on-orbit maintenance or verification activities which are required by hazard reports.

4.2 SAFETY REVIEW REQUIREMENTS

~~A. The PD shall implement the safety requirements of NSTS 1700.7, Safety Policy and Requirements for Payloads Using the Space Transportation System; NSTS/ISS 1700.7 ISS Addendum, Safety Policy and Requirements for Payloads Using the International Space Station - ISS Addendum; and KHB 1700.7, Space Shuttle Payload Ground Safety Handbook in accordance with NSTS/ISS 13830, Payload Safety Review and Data Submittal Requirements.~~**It is the responsibility of the payload customer to assure the safety of payload hardware and operations. All customer-provided hardware and GSE shall be designed and operated to comply with the requirements of NSTS 1700.7, Safety Policy and Requirements for Payloads using the Space Transportation System, and KHB 1700.7B/45 SPW HB S-100, Space Transportation System Payload Ground Safety Handbook. Safety reviews will be conducted in accordance with NSTS/ISS 13830, Payload safety Review and Data Submittal Requirements for Payloads Using the Space Transportation System and International Space Station.**

Element hardware, payloads, and non-GSE planned for ground processing at KSC must comply with the safety requirements defined in KSC document, KHB 1700.7.

~~B. The PD shall provide safety documentation to the appropriate ISSP organizations for each safety review: the EXPRESS Rack Office and~~ **~~in accordance with NSTS/ISS 13830:~~** ~~Johnson Space Center (JSC) for flight design/operations and KSC for ground design/operations. The safety review meeting will be scheduled approximately 45 days after receipt of an acceptable data submittal. The ISSP, represented by the JSC Safety Office, will coordinate and schedule the flight design and operations safety reviews. The ISSP, represented by the KSC Launch Site Support Manager (LSSM) and/or Ground Safety Review Panel Chair, will coordinate the ground design and operations safety reviews.~~

~~The Phase III Flight Safety Review for EXPRESS Rack payloads must be conducted prior to Launch minus (L-) 11 months to support the integrated rack processing schedule. Additionally, both the Flight and ground Phase III Safety Reviews, including closure of ground safety verification and~~ **~~the~~** ~~ground safety certification, must be completed 30 days prior to payload and GSE delivery to KSC.~~

~~C. The PD shall identify any open verification status items from the flight Phase III Safety Review, as reported in the Payload Flight Safety Verification Tracking Log and provide rationale for acceptance of this condition prior to commencement of ground processing. Flight safety certification must be completed 17 days prior to the ISS Flight Readiness Review (FRR.)~~

~~D. When changes to design or operations of the payload/GSE are required subsequent to Phase III, the PD shall provide an assessment for those changes for possible safety implications, including the effect on all interfaces. The assessment will be forwarded to the ERO, JSC and/or KSC safety panel for review and approval. The assessment will also include the reason for the change and the safety impact, if any.~~

~~E. The PD shall prepare and submit new or revised hazard reports and support data when applicable. The need for a delta Phase III Safety Review will be determined by hazard potential involved. Satisfactory completion of all this activity is mandatory prior to launch.~~

~~Changes to GSE design and ground operations must be approved by the LSSM and KSC safety panel~~ **Chairman, GSRP** ~~prior to use of the GSE or procedure.~~

~~In conjunction with the Increment Operations Review (IOR), payload configuration (including systems and procedures) will be reviewed by the ISSP with PD participation to highlight safety concerns and resulting operations decisions.~~

~~F. In support of the IOR~~ **this review,** ~~the PD shall provide the Payload Operations Director (POD) and ISS~~ **Payload Safety Review Panel** ~~(PSRP) with any additional safety-related data which may impact flight operations decisions.~~

~~G. The PD shall submit a flight readiness statement for the payload to the ERO, to support~~ **at** ~~the FRR, in accordance with SSP 50108, Certification of Flight Readiness Process Document.~~

~~H. The PD shall submit a~~ **signed** ~~safety endorsement letter as part of the certification for flight from the PSRP.~~

4.2.1 Payload ~~Design and~~ On-Orbit Operations Requirements

A. The PD shall ensure the payload design, including interfaces and operations, complies with the requirements of NSTS~~/ISS~~ 1700.7 and NSTS~~/ISS~~ 1700.7 ISS Addendum. These safety requirements are supplemented by the interpretations and clarifications contained within NSTS 18798, Interpretations of NSTS/ISS Payload Safety Requirements - **Safety Package**. The **PD shall ensure the** payload **design** will meet these requirements at the launch/landing sites and during ~~flight operations, on-orbit operations,~~ **on-orbit operations on the ISS,** flight operations **on the shuttle,** and **during** ferry flights.

B. The PD shall perform all interaction/interface safety analyses for the payload interfaces with the EXPRESS Rack. **The PD is responsible for development and**

submittal of required safety data packages and also for the coordination and completion of each safety review via the Payload Safety Review Panel (PSRP) executive secretary per ~~In this analysis, failures specified in~~ SSP 52000-IDD-ERP, EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Rack Payloads Interface Definition Document, for interface services and the flight operations ~~will be assessed by the PD~~. **Controls specified in SSP 57025, ISS Payload Systems Fault Tolerance Document, may be utilized during this safety analysis.** The analysis will define assumptions made by the PD with respect to EXPRESS Rack services and operations associated with hazardous payload functions. The analysis will identify potential payload failures which could propagate to the EXPRESS Rack and exceed the design criteria in the payload-unique ICD.

~~During real-time ISS operations, the ISS has final safety responsibilities. The POIC (with support from remote sites, if necessary) has the responsibility to support the ISS by reporting changes in the payload safety status and providing expert advice on safety matters affecting the payload or its operation.~~

C. The PD shall report **on-orbit** payload safety status changes to the POIC. **During real-time ISS operations, the POIC (with support from remote sites, if necessary) has the responsibility to support the ISS by reporting changes in the payload safety status and providing expert advice on safety matters affecting the payload or its operation.**

4.2.2 Ground Support Equipment Design and Ground Operations Requirements Compliance

A. The PD shall ensure that the ground operations and the design of their respective GSE complies with the ground safety requirements imposed by KHB 1700.7.

B. The PD shall ensure that all of their newly designed and fabricated hardware/software categorized as GSE that is to be permanently turned over to the ISS Program (DD250 to National Aeronautics and Space Administration (NASA)) complies with the requirements of SSP 50004, Ground Support Equipment Design Requirements. The purpose of SSP 50004 is to provide the ~~ISSP~~ISS Program with a single top-level set of requirements for the design, development, and fabrication of GSE for ground processing and to provide a guide for Test Support Equipment (TSE).

~~B~~**C**. The PD shall conduct hazard analyses for the payload and GSE, prepare safety data packages, and schedule and participate in phased safety reviews in accordance with the procedures defined in NSTS/ISS 13830.

~~C~~**D**. The PD shall submit hazardous and non-hazardous Technical Operating Procedures (TOP) to the LSSM 55 days before first use. The TOPs will then be reviewed by the LSSM and the appropriate KSC representatives. The hazardous TOPs are required to be approved by the Launch Site Safety Office (LSSO), ~~published and on-the-shelf 30~~ **10** days prior to use (~~10~~ **seven** days prior to use for revisions, **and three days prior to use for page changes**), in accordance with KHB 1700.7 and **KHB 1710.2**.

E. The PD shall provide Material Safety Data Sheets (MSDS) for materials which could pose a hazard to ground personnel in accordance with KHB 1700.7B for on-line and off-line areas. Also, the PD shall provide Process Waste Questionnaires (PWQ) for waste disposal at KSC. A PWQ form will be given to the PD by KSC safety upon request.

4.3 BIOMEDICAL INVESTIGATIONS

JSC 20483, ~~Human Resource Policy and Procedures for Space Flight and Related Investigations,~~ **Human Research for Space Flight and Related Investigations,** establishes policies to be implemented by the NASA-JSC Institutional Review Board (IRB) regarding human research protocol. The ~~ISSP, represented by the IRB~~**Partners' IRB and Human Research Multilateral Review Board (HRMRB)** will review and approve any protocols in which the payload uses preflight, in-flight, on-orbit, or post-flight scientific or medical protocol on human subjects on the ISS. **The following paragraphs C and D will address the care and use of laboratory animals in space flight investigations on ISS.**

A. The PD shall prepare and support an integrated hazard assessment of the entire payload and its interfaces for each flight increment and/or resupply mission. The flight surgeon in the Mission Control Center - Houston (MCC-H) Flight Control Room (FCR) is the real-time authority regarding flight crew health in-flight. The ~~ISSP~~**ISS Program**, represented by the MCC-H FCR Surgeon ~~<TBD 4-2>~~, will perform real-time monitoring of biomedical items requiring physician monitoring on the ground with respect to flight crew health and safety. **The requirement for** crew member consent and the restriction**s on the use** of crew members **as subjects** are described in SSP 50260, International Space Station Medical Operations Requirements Document (ISS MORD).

B. The PD, with approval from the **HRMRB**~~IRB~~, shall determine the data monitoring requirements for particular biomedical experiments being performed. For some biomedical experiments (intense exercise, lower body negative pressure, etc.), downlinked electrocardiogram data will be required by the FCR surgeon.

C. The PD shall comply with NIH 85-23, Guide for the Care and Use of Laboratory Animals for Space Flight Investigations, and NMI 8910.1, Care and Use of Animals in the Conduct of NASA Activities, when a payload uses vertebrates.

D. PDs utilizing vertebrates and installed in United States (U.S.) elements or utilizing U.S. controlled hardware shall submit their flight protocols to the Ames Research Center (ARC) Institutional Animal Care and Use Committee (IACUC) for approval. Upon review and approval, these protocols will be forwarded to the KSC IACUC for approval in the event that said vertebrates are housed in KSC facilities pre/post flight. Any utilization of vertebrates for crew training at JSC with the associated vertebrate elements will require forwarding to the JSC IACUC following ARC approval for ground activities.

SECTION 5, INTERFACE DESIGN REQUIREMENTS, VERIFICATION, AND TESTING

A. The PD shall design and build flight hardware and software in accordance with SSP ~~57000~~**52000**-IDD-ERP and the unique payload ICD.

~~C~~**B.** The PD shall develop the unique payload verification plan in accordance with SSP 52000-PVP-ERP, Generic Payload Verification Plan, EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Rack Payloads. The ERO~~, ISSP~~**ISS Program** and the PD shall approve the unique payload verification plan. The ~~ISSP~~**ISS Program** and SSP will perform additional analysis of the payload to ensure that the Orbiter middeck, MPLM and ISS on-orbit payload complements are safe, compatible, and operable with the ISS and SSP systems and interfaces.

~~B~~**C**. The PD shall certify to the ERO that all payload verification has been completed and the required data and models are complete and accurate and have been submitted to the ERO as documented in the unique payload verification plan.

D. ~~**D.**~~ **The PD shall provide manifest/stowage requirements data for the ISS manifest, the ISS cargo integration, and the flight crew support division via the PDL in accordance with the manifest/stowage requirements in Section 9.3.3 of the Payload ~~Configuration~~ Data Set Blank Books, SSP 52000-PDS. The data collected for the manifest will support the production of the Increment Definition and Requirements Document (IDRD) for specific planning period XX, Annex 1: Station Manifest Documents. ISS cargo integration requires data in order to plan and design the launch, on-orbit, and return configuration of payload stowage into the on-orbit modules and logistics carriers. This data includes mass, dimensions, stowage engineering drawings, hazard code, item groupings, location needs, unique packing or stowage requirements, etc., to support the manifest/stowage integration process. ~~The PD shall provide any constraints, for the most efficient stowage arrangement, in the event soft goods, cables, or other items must be refolded, rolled, stuffed or stacked for the most efficient stowage arrangement in a bag, tray, logistics carrier, and on-orbit ISS vehicle.~~ISS Cargo Integration uses this data for the stowage layout (configuration) for the flight transportation (up and down) of the stowage item as well as the on-orbit stowage configuration of the ISS.**

E. All PDs developing laptop displays shall conform to the requirements of SSP 50005, International Space Station Flight Crew Integration Standard (NASA-STD-3000/T) - paragraph 9.4.2.3.2, and SSP 58700-ANX5, PODF Management

Plan, Annex 5: Payload Display Implementation Plan and SSP 58700-ANX6, PODF Management Plan, Annex 6: Payload Display Developer's Guide. The PD shall submit the payload displays to the ISS Program Payload Display Review Panel (PDRP) for approval.

5.1 PAYLOADS INTERFACE REQUIREMENTS AND CONTROL

Payload to EXPRESS Rack interface requirements are documented in SSP 52000-IDD-ERP, EXPRESS Rack Payloads Interface Definition Document (IDD).

A. The PD shall ensure that payload flight hardware and software is designed and built in accordance with the applicable subsections of SSP 52000-IDD-ERP. Applicable requirements are determined according to the interfaces utilized by the payload flight hardware and software**.**

B. Design characteristics of the interfaces utilized by the payload flight hardware/ software and unique ~~EXPRESS Rack~~ ISS implementation characteristics for the particular payload locations are documented and controlled in the payload-unique ICD. The ERO will develop **a** unique payload ICD~~s~~ utilizing PD-provided interface implementation data.

~~B~~**C**. The ~~ISSP~~ **ERO** and PD shall approve the payload-unique ICD. ~~Addenda to the payload-unique ICD are developed and approved for each subsequent increment, as necessary, to document and control any changes to the payload flight hardware or software or ISS interface implementation.~~

*5.1.1 ~~Mini-Pressurized~~ **Multi-Purpose** Logistics Module Transported Payloads*

Basic design loads and requirements for payloads transported in the EXPRESS Rack/EXPRESS Transportation Rack (i.e., MPLM) are documented in SSP 52000-IDD-ERP.

A. The PD shall deliver the structural models to the ERO as specified in the payload-unique verification plan and SSP 52005, **ISS** Payload Flight Equipment Requirements and Guidelines for Safety-Critical Structures.

B. The PD shall provide data and models in accordance with the ~~payloads integrated~~**negotiated payload-unique integration manager** schedule~~. contained in the <TBD 3-1> Payload **Integration** Schedule~~.

~~The ERO will perform a Design Loads Analysis (DLA) for the integrated EXPRESS Rack Launch Package/Return Complement using the best available models provided by the PD. The DLA will include the lift-off, ascent and descent quasi-static, abort landing,~~

~~emergency landing and nominal landing flight regimes as appropriate. Results of the DLA will be provided to the PD in accordance with <TBD3-1> Payload Schedule so that the PD may perform the necessary analyses to ensure positive margins for all expected environments. After the DLA activity, the ERO will obtain the test verified models from the PD to develop an integrated test-verified rack model. This integrated test-verified rack model will then be provided to the ISS who will perform a Verified Loads Analysis (VLA) for the Launch Package/Return Complement. The VLA will include the lift-off, ascent and descent quasi-static, abort landing, emergency landing and nominal landing flight regimes as appropriate. Results of the VLA will be provided to the PD in accordance with <TBD 3-1> Payload Schedule.~~

*5.1.2 ~~Orbiter Middeck Transported Payloads~~**EXPRESS Rack and EXPRESS Transportation Rack Transported Payloads***

Basic design loads and requirements for payloads transported on an EXPRESS Rack or EXPRESS Transportation Rack are documented in SSP 52000-IDD-ERP.

A**. The PD shall deliver the structural models to the ISS Program as specified in SSP 52000-IDD-ERP, and SSP 52005, Payload Flight Equipment Requirements and Guidelines for Safety-Critical Structures.**

B. The PD shall provide data in accordance with the negotiated payload-unique integration manager schedule~~payloads integrated schedule contained in the Payload Integration Schedule~~.

*5.1.3 **Orbiter Middeck Transported Payloads***

Basic design loads and requirements for Orbiter middeck transported payloads are documented in SSP 52000-IDD-ERP.

A. ~~If required,~~ The PD shall ensure delivery of structural ~~models~~ **data** to the ERO as specified in the payload-unique verification plan, **NSTS 21000-IDD-MDK,** and SSP 52005.

B. For powered Orbiter middeck transported payloads, the PD shall provide electrical, ~~EMC/EMI, and acoustic and~~ thermal**, EMC/EMI, and acoustic** data and models to the ERO as specified in the payload-unique verification plan.

C. The PD shall provide data in accordance with ~~<TBD 3-1>~~ **the negotiated** payload**-unique** integration **manager** schedule.

5.2 LIMITATIONS FOR NON-FLIGHT MATERIALS

The PD shall ensure that the payload hardware complies with material and equipment requirements defined in **KHB 1700.7 and** NSTS 08242, Limitations for Non-flight Materials and Equipment Used In and Around the Space Shuttle Orbiter Vehicles, during KSC ground operations ~~in/or around the Shuttle~~.

5.3 VERIFICATION AND TESTING

~~A. The PD shall develop a payload -unique payload verification plan in accordance with the instructions and verifications requirements documented in SSP 51000-PVP-ERP.~~

A. The unique payload verification plan will be generated from the payload ICD via the PDL. The PD shall submit the unique payload verification plan for review and approval by the ERO. All plans will be submitted to the ERO in accordance with the payload integration and verification schedule located in the payload integration schedule. The unique payload verification plan defines the complete set of verification requirements and activities necessary for the PD to ensure compliance with the EXPRESS Rack payload design-to requirements identified in the EXPRESS Rack IDD. A description of any GSE used to simulate flight hardware will be identified.

~~B. The PD shall submit the unique payload verification plan for review and approval by the ERO. All plans will be submitted to the ERO in accordance with the Payload Integration and Verification Schedule located in <TBD 3-1> Payload Schedule. The unique payload verification plan must contain a description of all test and checkout hardware/software used for payload verification.~~

~~C~~**B.** ~~The PD shall provide Certification of Compliance Flight Readiness with the payload-unique ICD, and provide engineering and/or test data to the ERO and ISS as specified in the unique payload verification plan. This data is also provided in accordance with the <TBD 3-1> Payload Schedule.~~

~~C~~**B. ~~The PD shall verify the payload hardware and software functional performance in accordance with the PD's unique verification plan. Status reporting of the closeout of functional performance verification requirements shall be provided according to the process and schedule defined in SSP 52054, ISSP Payloads Certification of Flight Readiness Implementation Plan. Certification that functional performance verification was successfully completed shall be provided via signature of the CoFR 1 endorsement consistent with the CoFR plan.~~The PD shall verify the facility payload/subrack hardware and software functional performance, ISS interface and safety controls in accordance with the**

PD's unique verification plan. The PD shall provide engineering and/or test data to the ISS and Shuttle Programs as specified in the unique payload verification plan. Status reporting of the closeout of functional performance verification requirements shall be provided according to the process and schedule defined in SSP 52054, ISS Program Payloads Certification of Flight Readiness Implementation Plan. Certification that functional performance verification was successfully completed shall be provided via signature of the CoFR 1 endorsement consistent with the CoFR plan.

~~D. The PD shall certify that the payload/experiment functional performance has been verified in accordance with the ISSP guidelines specified in <TBD 5-1>.~~

~~E~~**D**C. The PD shall verify compatibility with the interfaces and environments specified in ~~this EIA~~ the IRD and the payload-unique ICD. **When applicable,** verification of physical and functional interface compatibility with the EXPRESS Rack will be ~~accomplished as a minimum~~ **aided** by the use of a Program-provided ~~Suitcase Simulator (ScS)~~ **Payload Rack Checkout Unit (PRCU) or equivalent.** The ~~ScS~~ **PRCU** units will be provided at PD sites as negotiated and documented in Section 3.2 ~~Program Furnished Equipment,~~ of the Addendum.

The Payload Test and Checkout System (PTCS) located at KSC provides final interface compatibility testing of the payload to EXPRESS Rack using the EXPRESS Functional Checkout Unit (FCU). **The ~~ISSP~~ISS Program will complete all testing of integrated racks in the PTCS prior to installation into the MPLM.**

~~F~~**ED**. For payloads with direct interfaces with the Orbiter, the PD shall verify compatibility with the Orbiter interfaces and environments as specified in the payload-unique ICD and verification plan.

~~G~~**FE**. The middeck payload-to-Orbiter interface verification requirements shall be identified by the PD and developed with KSC support in the KSC Technical Requirements Data Set**, Section 8.0, SSP 52000-PDS, ISS Payload Data Sets (PDS) Blank Book**.

~~H~~**GF**. The PD shall identify and document in the KSC Technical Requirements Data Set**, Section 8.0, SSP 52000-PDS, ISS Payload Data Sets (PDS) Blank Book,** any middeck payload-to-Orbiter interfaces which cannot or will not be verified prior to flight.

~~I~~**HG**. The PD shall also document the supporting rationale for not testing the interface in the KSC Technical Requirements Data Set**, Section 8.0, SSP 52000-PDS, ISS Payload Data Sets (PDS) Blank Book**.

H. The RPO, with PD support, shall provide certification of readiness statements to the ISS Program consistent with the requirements and process defined in SSP 52054, ISS Program Payloads CoFR Implementation Plan.

SECTION 6, OPERATIONAL REQUIREMENTS

~~6.1MISSION REQUIREMENTS~~

Requirements for payload planning, training, operating procedures and references, ground data services, on-orbit payload verification and checkout, and baseline data collection are contained in this section. These requirements, along with other operational topics, will be discussed with the Payload Operations Integration Center, at Payload Operations Integration Working Groups (POIWG~~s~~).

A. The PD shall attend the POIWG meetings.

B. Real-time, the PD shall operate the payload in accordance with the POIC policies and procedures established by the POIC Payload Operations ~~Guidelines and Constraints, Volume 2 Regulations (<TBD 6-1> Document)~~ **Regulations (<TBD 6-7>).**

6.1 **PAYLOAD** PLANNING DATA SET

The PD shall provide payload planning and resource requirements specifications to the POIC planners as specified in the **Payload Data Sets Blank Book, SSP 52000-PDS, Section ~~4.8~~10.0, Payload Planning Requirements Data Set via the iURC/URC tool.** These include onboard resources such as crew time, power, thermal, command and file uplink and data downlink requirements. Using the payload, systems, and program requirements and constraints, the ~~ISSP~~**ISS Program**, represented by the POIC mission planners, will develop integrated payload plans which will be integrated with the ISS systems plan. The POIC mission planners will provide the PD the integrated planning products, including the Payload On-Orbit Operations Summary (PL OOS), via the Increment Operations Plan (IOP).

~~6.1.2~~**6.2** TRAINING ~~DATA SET~~

~~The ISSP, represented by the Payload Training Integration Manager (PTIM), will coordinated with the PD via a series of Training Strategy Team (TST) meetings to determine specific payload training plans for the crew and Ground Support Personnel (GSP). The TST meetings will be scheduled to provide for the timely acquisition of detailed information required by the PTIM to support ISSP planning and documentation. Information provided in Section 6 of the addendum will be used as a starting point for these TST Meetings, as well as for inputs into the tactical planning process.~~

~~A. The PD shall provide detailed training requirements resulting from the TST process in the Payload Training Data set. For more detailed information on determining the training and simulator requirements, see D683-<TBD 6-2>, NASA Payload Training Implementation Plan (NPTIP).~~

~~B. To support payload training, the PD shall develop and deliver to JSC a payload simulator and /or trainer which will support crew training on nominal, maintenance, safety-related, and limited malfunction operations. Training simulators for all but simple or single-increment payloads will provide high-fidelity crew interfaces and will be integrated into the EXPRESS Rack Simulators in the Space Station Training Facility (SSTF)/Payload Training Center (PTC) . A Payload Simulator Requirements Document (PSRD) book managed by the Payload Operation Integration Function (POIF) will be jointly developed with the PD for each of these payloads. These simulators will also be used to support simulations integrating the crew and ground controllers. Simple or single-increment payloads will require a stand-alone or Computer-Based Trainer (CBT). Special training equipment (e.g., CBT, light weight mockups, videos, etc) may also be required to support specific payload training objectives. In addition, training may require the use of supporting services such as telecommunications and data links.~~

~~C. The PD shall support the development of training plans, procedures, courseware, or other materials for all training related to their payload.~~

~~The ISSP, represented by the POIC Payload Operations Director, will certify the PD operations team to interface with the payload crew onboard the ISS and to interface with POIC. This certifications will be based on training requirements included in the <**TBD** 6-3>, User Training/Certifications Plan requirements.~~

~~D. The PD shall require team members names and functions to the PTIM during the TST process for determining individual PD team member training curriculums. This curriculum may include participation in simulations integrating the crew and the ground support personnel.~~

~~*6.1.2.1*~~*6.2.1 Training Requirements*

A. ~~The PD shall develop a document which defines the detailed specifications for each trainer/simulator to be supplied.~~ The PD shall develop a trainer specification document that defines how each PD provided trainer/simulator will meet the requirements specified in SSP 58026-01, Generic Payload Simulator Requirements Document (PSRD), Volume 1. This document shall be included in the PD's Preliminary Design Review (PDR) and Critical Design Review (CDR)

data packages. ~~The required contents of the trainer specifications document can be found in the NASA Payload Training Implementation Plan (NPTIP). (TBR~~)

B. The PD shall define the process and requirements for integrating subrack payload simulator/trainers into the facility payload trainer. A simulator Interface Definition Document (IDD) will also be required of each facility class payload who will accommodate subrack payload simulators/trainers. The IDD would define the interfaces required for a subrack payload developer to design a simulator/trainer that would be used within the facilities simulator/trainer.

~~6.1.2.2~~6.2.2 Payload Training Data Set

~~A.~~ ~~The~~ The data requested in this document will be required for ~~facilities~~EXPRESS, subrack payloads and experiments (not including ~~EXPRESS subrack~~facilities and facility subrack payloads and experiments).

~~B~~A. The PD shall participate in the Training Strategy Team (TST) process for the purpose of defining crew and GSP training and simulator requirements. The TST process is documented in detail in the SSP 58309/~~NPTIP~~NASA Payload Training Implementation Plan (NPTIP). Requirements discussed and agreed to during the TST process will be documented in the payload training data set.

~~C~~B. To support payload training, the PD shall develop and deliver to JSC a payload simulator which will support crew training on nominal, maintenance, safety-related, and limited malfunction operations. SSP 58026-01, -02, Payload Simulator Requirements Document (PSRD) Volumes I and II, will be will be developed by ~~NASA~~POIC for each of these payloads. Volume I of the PSRD will be a generic document with an appendix that is applicable to the specific type of payload being developed. Volume II of the PSRD will be payload-specific and will include payload-specific checkout information, display definitions, and ~~agreements concerning the PTS~~information required for integration of the simulator in the applicable NASA JSC training facility. The PD ~~will~~shall support the development of this document by supplying supporting data to the payload training data set.

~~D~~C. Training simulators for all but simple or single-increment payloads will provide high fidelity crew interfaces and will be integrated into the Space Station Training Facility (SSTF)/Payload Training Center (PTC). These simulators will also be used to support simulations integrating the crew and GSP. Simple or single-increment payloads will require a standalone trainer or Computer-Based Trainer (CBT). Special training equipment (e.g., CBT, light weight mockups, videos, etc.) may also be required to support specific payload training objectives.

In addition, the PD shall provide the PD's requirements for the use of supporting services such as telecommunication and data links in the training data set.

~~E~~D. The PD shall support the development of training plans, procedures, courseware, or other materials for all training related to their payload. This also includes the development of flight products such as crew procedures and displays in time to support training verification activities.

~~F~~E. Training records will be collected for all training sessions. When the training takes place at the PD's site, the PD is responsible for tracking and recording training hours. When training takes place in the SSTF/PTC, the ~~instructor~~Crew Training Coordinator (CTC) shall be responsible for tracking and recording training hours. All training records shall be provided to the ~~Payload Training Integration Manager (PTIM)~~Payload Training Integrator (PTI).

~~G~~F. The PD shall provide detailed crew training requirements and shall identify ground support requirements in the payload training data set. This will include training curricula for the crews who will operate the payload on-orbit.

~~H~~G. The PD shall provide detailed trainer/simulator requirements in the payload training data set. Portions of the data contained in the payload training data set will be used in the construction of instructor/operator station display definition, malfunction simulation development, etc., and these items will be published in the ~~Payload Simulator Requirements Document~~PSRD, Volume II. The training data set contents will also document training assessment results of the TST process. For more detailed information on determining the training and simulator requirements, see the NPTIP, ~~MSFC-PLAN-2846~~SSP 58309.

~~I~~H. The PD shall provide team member names and functions in the payload training data set. The PD shall define the PD team members training curriculum requirements in the training data set. The PD shall participate in required training to become certified for flight operations. The applicability and usage of the User Training and Certification Plan relative to this section is TBD <TBD 6-3>.

~~J~~I. The PD shall define Telescience Support Center (TSC) specific requirements in the payload training data set.

~~K~~J. The PD shall provide on-onboard training materials when required by the TST process. These materials will be developed in accordance with SSP 50503 and verified per SSP 58309.

6.3 OPERATIONS

*~~6.1.3~~**6.3.1** Payload Operations Data Set*

The following paragraphs provide an overview of information required to be input into the payload operations data set.

*~~6.1.3.1~~**6.3.2** Payload Operations Data File*

A. The PD shall provide payload operating procedures and reference materials (e.g., schematics, maps, message lists, etc.) for the payload. These inputs will include installation, checkout, nominal, malfunction, or contingency, automated procedures for both the ETOV and on-orbit operations. **The PD shall provide procedure input via the Online Project Management System (OPMS)/Payload Integration Management System (PIMS).~~ via PIMS.~~** The ~~ISSP~~**ISS Program**, represented by the POIC, will integrate these procedures and references into the ISS payload operations data files.

B. The PD shall input specific procedures to be used by POIC cadre or payload team personnel in response to onboard payload or ISS contingencies. The payload operations preparation team will integrate these procedures into the <**TBD 6-4**>, Ground Malfunctions Book.

6.4 GROUND

*~~6.1.3.2~~**6.4.1** Ground Procedures and Reference Material*

A. The PD shall provide ground procedures and reference materials for the payload. The POIC cadre will develop the<**TBD 6-5**>, Payload Systems Manual (PSM) for ground personnel reference. This reference document includes information on end-to-end systems and payload operations, including POIC displays, error message references, electrical, command, data, and environmental control systems interfaces, experiment operations descriptions, and other payload operational specifications. The <**TBD 6-6**>, Payload Operations Handbook, establishes internal POIC and POIC-to-user operations centers standard operations procedures. Any unique payload team information may be submitted by the PD, such as phone and fax numbers, etc. **The PD ~~will~~shall provide procedure input via ~~PIMS~~OPMS.**

B. The PD shall input any known operational constraints or activities that may adversely impact the science or hardware of other payloads or themselves. These impacts will be integrated and documented in the<**TBD 6-7**>, POIC Payload Regulations.

C. The PD shall submit any known payload activities that may adversely impact Shuttle or EXPRESS Rack systems, or crew health or safety to be integrated and documented in the appropriate flight rules document.

D. The PD shall also provide payload inputs (as appropriate) to the flight systems, including Multiplexer/Demultiplexer (MDM) files and Payload Executive Processor (PEP) tables. The PEP tables provide command and telemetry for the payload MDM.

*~~6.1.4~~**6.4.2** Ground Data Services **Data Set***

The PD shall ~~submit requirements for~~ **provide** the ground data services ~~to the ISSP~~ detailed requirements through the Payload Ground Data **Services Data** Set. ~~This will include requirements for voice loops, ground video conferencing, downlink video, uplink video and files, commanding, and downlink and playback telemetry. Also included are requirements for ground support equipment power, facility floor space, facility terminals, etc., needed for the PD's that operate in ISSP-provided facilities such as the United States Operations Center (USOC) or a Telescience Support Center (TSC). Requirements for interfaces for remote PD sites and/or operations in the USOC will be collected in the Payload Ground Data Requirement Data Set in PDL. Requirements for operation in an ISSP-provided TSC will be collected by <TBD 6-9>.~~ These services include payload unique services required ~~if~~ in **the** United States Operations Center (USOC), TSC, or at a remote site, including network and/or hardware connectivity requirements. The ground data services data set also addresses the PD identification of voice loop requirements, ~~data/video requirements, Enhanced Huntsville Operations Support Center (HOSC) System~~**POIC** service requirements, and USOC facility requirements.

6.5 ON-ORBIT

*~~6.1.5~~**6.5.1** On-Orbit Payload ~~Verification, Test, and~~ Checkout*

A. The PD shall provide on-orbit test and checkout requirements for their payload **including orbital replacement units (ORU)**. These requirements are to ensure correct installation of the hardware into the EXPRESS Rack prior to nominal payload operations. Requirements for on-orbit ~~interface and safety~~ testing will be documented in the ~~payload-unique verification plan~~ **payloads operations data set**. ~~All on-orbit testing will be documented in the Payloads Operations Data Set.~~

B. The PD shall support, as needed, the on-orbit ~~verification~~, test~~,~~ and checkout of their payload hardware.

~~6.1.6~~**6.6** BASELINE DATA COLLECTION **~~<TBD 6-8>~~**

The ~~ISSP~~ISS Program will provide baseline data collection facilities at the primary launch and contingency landing sites for ISS ~~contingency landing sites for ISS~~ crews (KSC, Dryden Flight Research Center (DFRC), and Russia) <TBR 6-2>. Facility capabilities and requirements will be documented in <TBD 6-8>. Preflight and post-flight crew time requirements and facility usage requirements will be documented in <TBD 6-9>. If crew biomedical data is not needed as part of the research objectives, this section is N/A.

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SECTION 7, LAUNCH/LANDING SITE PROCESSING

KSC launch site processing includes off-line support, both physical integration and deintegration, and the checkout of payload interfaces to high-fidelity EXPRESS Rack and Orbiter simulated interfaces and actual Orbiter interfaces. Payload processing activities extend from prelaunch to post-landing phases, including supporting late access to the MPLM and to the Orbiter middeck and payload bay, as well as early access to the MPLM and to the Orbiter middeck. Detailed information regarding KSC launch site processing is contained in SSP 52000-PAH-KSC, KSC Payload Launch Site Processing Payload Accommodations Handbook.

Any payload requirements levied on KSC that are ~~ISSP Non-Standard Services,~~ SSP non-standard services~~, or SSP Standard Services~~ will be negotiated and documented in Section 1.3 of th~~eis~~ Addendum **to this document. All ~~ISSP~~ISS Program launch support services available are considered standard support services and are identified in the PDS Support Requirements Data Set.** The corresponding details of these Addendum requirements **and** ~~along with the~~ ISS standard services are negotiated and documented in the KSC Technical Requirements and KSC Support Requirements Data Sets**, as documented in SSP 52000-PDS.**

7.1 PAYLOAD PROCESSING

A. The PD shall support KSC in the development of the KSC payloads deliverable schedule.

~~B~~. Following offline processing, all online processing and payload installation activities are scheduled, performed, and controlled by KSC Launch and Landing (L&L) personnel.

~~C~~**B**. The PD shall provide support for the payload processing as necessary. Fit checks with different payload hardware, Orbiters, middeck locations, and/or EXPRESS Rack interfaces will be determined by the ERO, SSP, KSC, and PD on a flight-by-flight basis. Crew Equipment Interface Test (CEIT) ~~requirements~~ will be ~~conducted~~ **determined** by the crew office ~~and coordinated through the Vehicle Integration Test Office (VITO)~~.

~~D~~**C.** The PD shall be responsible for providing/funding a second set of payload-unique ground equipment ~~and/or mission integration hardware~~ whenever an overlapping requirement for the use of this equipment is identified for concurrent payload integration activities.

D. During the launch site processing of the payload, the SSP will conduct an inspection of the payload for sharp edges/corners/surfaces or protrusions which may injure a crew member or damage associated equipment. This inspection will be coordinated with the ~~ISSP~~ISS Program, and corrective actions will be taken by the ~~ISSP~~ISS Program or the ~~ISSP~~ISS Program's representatives. Hazards not correctable will be identified and documented. Because of potential lack of access due to payload configuration, some inspections and photographs will have to be performed at the vendor or contractor's facilities at convenient points during the payload's assembly and integration before shipment of the payload to KSC.

In addition, a complete set of payload photographs is required to be taken by the ~~ISSP~~ISS Program during individual cargo element assembly and buildup. The SSP will take required photographs of the payload before and after installation in the Orbiter including close-out photographs. These photographs are necessary to support ground operations, flight crew and flight controller training, Flight Data File (FDF) development, and possible in-flight contingencies. This documentation photography should show all areas of the payload where repair or service may be required and shall include photography of interface/tools. These photographic activities will be scheduled and coordinated with the ~~ISSP~~ISS Program.

7.1.1 Orbiter Middeck Payloads

A. Payload hardware transported to orbit in the Orbiter middeck will be nominally installed at the launch pad prior to the start of the mission launch countdown. The payloads will be installed and any interface verification tests, close-out procedures, and payload-unique tests will be accomplished by the SSP.

Fit checks will be required in the Orbiter for all first time manifested middeck payloads that are replacements for Middeck Lockers (MDL). This nominally occurs when the Orbiter is in the Orbiter Processing Facility (OPF) prior to or during the flight CEIT. The need for subsequent fit checks with different payload hardware, Orbiters, or middeck locations will be determined by the SSP, KSC, and PD on a flight-by-flight basis.

Payload services such as middeck prelaunch power, dedicated cooling, and data monitoring are SSP non-standard services.

B. The following is applicable if the payload has middeck late access (installation/servicing) requirements.

Payload requirements for the late installation of payload hardware and/or late payload servicing are SSP non-standard services. These requirement~~s can~~ **categories will** be defined in ~~any of the following categories~~**Addendum 1.3.1**:

~~Category 1 - The payload requires late installation/servicing within~~ **Launch minus (L-)** ~~3 days but prior to L-24 hours. The payload will be turned over from the PD to NASA KSC to allow installation in accordance with launch countdown and crew compartment stowage activities.~~

~~Category 2 - The payload requires late installation/servicing within L-24 hours. The payload will be turned over from the PD to NASA KSC to allow installation in accordance with a mission-unique stowage schedule.~~

~~Category 3 - The payload requires late installation/servicing within a specific time between L-24 hours and L-18.5 hours (prior to the start of ascent switch list activities). The payload will be turned over from the PD to NASA KSC to allow installation in accordance with a mission-unique stowage schedule. This category is also an ISSP Non-Standard Service.~~

~~Category 4 - The payload requires late installation/servicing within a specific time between L-18.5 hours and L-15.5 hours (during times of conflict with the ascent switch list activities). This installation time must have additional approval and be integrated with other payloads by the KSC Launch Countdown Working Group. This category is also an ISSP Non-Standard Service.~~

~~A. The PD shall provide written justification for their requirements for payload installation within L-24 hours in terms of potential research/science loss. All middeck activity involving late installation of payload hardware must be completed by L-15.5 hours. Late installation requirements will not delay the vehicle launch countdown from proceeding to the primary mission planned launch window. Late installations for payloads with interface verification testing may affect manifesting. Late installation requirements will require coordination with the Launch Team/Launch Director during the launch countdown planning process. Installation conflicts may result in adjustments to installation times. Mission-unique middeck processing schedules will be developed by KSC based upon documented middeck installation times. Actual middeck turnover times will be scheduled to support these installations. PD to NASA KSC payload turnover times are typically 1.5 to 2 hours, but no more than 4 hours prior to installation to accommodate KSC preparation and transportation to the launch pad. If payload hardware requiring middeck late installation cannot be installed within its allocated time, the SSP may decide not to~~

~~install the payload or to fly the payload in a non-operational mode. For more information on middeck Orbiter Integration, reference NSTS 21000-SIP-MDK, Shuttle/Payload Standard Integration Plan for Middeck-Type Payloads.~~

~~ISSP Non-Standard and~~ SSP ~~Standard and~~ non-standard services associated with middeck late access must be negotiated and documented in Section 1.3 of the **this** EIA Addendum. **In addition, Section 1.3 of ~~this EIA~~the Addendum to this document will be used to document the PD's justification of their requirements for payload late installation within L-24 hours in terms of potential research/science loss. All middeck activity involving late installation of payload hardware must be completed by L-15.5 hours. Late installation requirements will not delay the vehicle launch countdown from proceeding to the primary mission planned launch window. Late installations for payloads with interface verification testing may affect manifesting. Late installation requirements will require coordination with the launch team/launch director during the launch countdown planning process. Installation conflicts may result in adjustments to installation times. Mission-unique middeck processing schedules will be developed by KSC based upon documented middeck installation times. Actual middeck turnover times will be scheduled to support these installations. PD to NASA KSC payload turnover times are typically 1.5 to 2 hours, but no more than 4 hours prior to installation to accommodate KSC preparation and transportation to the launch pad. If payload hardware requiring middeck late installation cannot be installed within its allocated time, the SSP may decide not to install the payload or to fly the payload in a non-operational mode. For more information on middeck Orbiter integration reference NSTS 21000-SIP-MDK, Shuttle/Payload Standard Integration Plan for Middeck-Type Payloads.**

~~*1.1.17.1.2 Mini-Pressurized Logistics Module Payloads*~~

7.1.2 Multi-Purpose Logistics Module Payloads

~~EXPRESS~~ **~~ISS~~PISS Program** payloads transported ~~to~~ **on-**orbit in the MPLM carrier will be installed in the MPLM after payload verification and checkout are completed. At approximately L-2.5 months, there is an opportunity for time-critical payload installation, stowage, servicing, and closeouts in the Space Station Processing Facility (SSPF). The MPLM is then transported to the ~~Pad~~ **launch pad** for installation into the Orbiter.

After MPLM installation into the Orbiter, access to payloads mounted inside the MPLM will be available only for late installation of conditioned samples into the refrigerators and freezers as an SSP non-standard service. Late access for stowage of refrigerator and freezer samples inside the MPLM is completed by ~~L-84 hours in the mission countdown~~**L-88 hours and is followed by MPLM late access GSE removal**.

SSP non-standard services associated with the late installation of payload conditioned samples must be negotiated and documented in Section 1.3 of this EIA Addendum.

7.2 LAUNCH READINESS

The following represents the PD's launch readiness requirements. The PD shall ensure:

A. The payload is capable of sustaining the launch configuration without physical access until such time as noted in Addendum Table 3.4.1-1, Payload Maximum Launch Configuration Duration. Exceptions to this (such as launch delays, identified in Section 7.3) must be negotiated and documented in Section 1.3 of the EIA Addendum.

B. The payload is capable of sustaining the transportation configuration until it is installed in the ISS.

7.2.1 Orbiter Middeck Payloads

Payloads that are installed in the Orbiter middeck must be in the launch configuration once prelaunch installation and verification activities are completed.

*7.2.2 ~~Mini-Pressurized Logistics Module Payloads~~ M**ulti-Purpose Logistics Module Payloads***

The MPLM payload will be in launch configuration prior to the final Orbiter payload bay door closure. **For payloads in MPLM that require power-on after MPLM closeout and payload bay door closure, the PD shall ensure that safety requirements for command and monitoring are met during the prelaunch, ascent, and early on-orbit mission phases.**

7.3 LAUNCH DELAY/SCRUB TURNAROUND PROCESSING

Delays in the Shuttle launches occur due to numerous unforeseen and uncontrollable events. Services provided to the payload due to launch delays are considered SSP non-standard services.

All MPLM Payloads should support ~~a minimum of~~ launch attempts for a minimum of ~~(~~96 hours~~)~~ from the initial planned T-0 without requiring MPLM access. Any MPLM access requirements of less than 96 hours~~launch attempts~~ must be negotiated with the SSP. In the event that a shuttle scrub causes a loss of MPLM power for greater than eight hours, then MPLM access will be provided. There are no

anticipated scrub scenarios which would result in the loss of MPLM power for greater than eight hours.

A. Due to the criticality of operations required to reestablish the proper launch configuration after a delay, the PD shall support delay scenarios as appropriate.

For samples/hardware requiring access as a result of a delay, the ~~ISSP~~**ISS Program** and the SSP will determine if servicing/change-out is possible under the actual conditions. If a replacement is agreed-to, the PD must plan for providing the necessary replacement items, personnel, and equipment.

Applicable launch delay scenarios are: 24-hour delay (middeck items only); 48-hour delay (middeck items only); and delays greater than 48 hours such as 72 hours, 96 hours, and 120 hours (middeck and MPLM). **For short launch delays, such as 24 hours, the time available for experiment refurbishment may necessitate replacement of samples at the pad in lieu of returning the hardware to the PD. For experiments with 24 hour launch delay requirements, the PD must have redundant hardware and/or biospecimens in order to facilitate an exchange at the ~~P~~launch pad.**

B. The PD shall specify all payload requirements for applicable launch delays.

SSP non-standard services associated with contingencies such as Orbiter launch delays/scrub turnaround must be negotiated and documented in Section 1.3 of ~~the~~ **this** EIA Addendum.

~~*1.1.1Contingency Vehicle Rollback*~~

~~In the event of a Vehicle Rollback to the Vehicle Assembly Building (VAB)~~**,** ~~the PD shall comply with the contingency rollback from the pad to the VAB requirement as specified in NSTS 07700, Program Definition and Requirements, Volume XIV, Space Shuttle System Payload Accommodations, System Description and Design Data, Appendix 5,~~ **Appendix 5, System Description and Design Data -** ~~Ground Operations. Payload-unique rollback requirements must be negotiated and documented in Section 1.3 of the~~ **this** ~~EIA Addendum.~~

7.4 POST-LANDING

7.4.1 Nominal Post-Landing Processing

If the End of Mission (EOM) landing is at the KSC Shuttle Landing Facility (SLF), time-critical middeck payload items (e.g., live specimens) are removed at the landing strip **(SSP non-standard service)** prior to Orbiter tow ~~(SSP Non-Standard Service)~~. The Orbiter

is then towed to the OPF, jacked and leveled, the remaining middeck payload items removed, and final safing/deservicing operations are completed. Conditioned samples are removed from the refrigerator/freezers in the MPLM approximately five days after landing. MPLM removal from the Orbiter is normally completed seven days after the Orbiter arrives at the OPF. The MPLM is then returned to the ~~ISSP~~**ISS Program** for further payload deintegration.

If the EOM landing is at ~~Dryden Flight Research Center (~~DFRC~~)~~, time-critical middeck payload items (e.g., live specimens) are removed at the landing strip **(SSP non-standard service)**, prior to Orbiter tow ~~(SSP Non-Standard Service)~~. The Orbiter is then towed to the Mate/Demate Device (MDD) and following jacking and leveling, the remaining middeck payload items are removed and final safing/deservicing operations are completed. At DFRC, access to conditioned samples in the MPLM will be at approximately Return plus (R+) 4 days. After all middeck and MPLM samples have been removed, the Orbiter (with the MPLM aboard) is mated to the Shuttle Carrier Aircraft (SCA) for return to KSC. After arrival at KSC, the Orbiter is de-mated from the SCA and towed to the OPF for payload removal and final de-servicing operations. MPLM removal from the Orbiter is normally completed seven days after the Orbiter arrives at the OPF. The MPLM is then returned to the ~~ISSP~~**ISS Program** for further payload deintegration.

SSP non-standard services associated with post-landing processing must be negotiated and documented in Section 1.3 of ~~this EIA~~**the** Addendum **to this document**. **Early access to the MPLM at KSC and DFRC for removal of conditioned samples is an SSP non-standard service.**

7.4.2 Intact Abort Processing

Should an aborted flight land at KSC or at DFRC, the SSP will remove the middeck payloads using its best efforts. If an aborted flight lands at a site other than KSC or DFRC, the payloads stowed in the Orbiter middeck will be removed and turned over to the PD at the landing site or will be returned by the SSP separately to the launch site for turnover to the PD.

If an aborted flight lands at a site other than KSC, all returned payload complement hardware in the MPLM will nominally remain onboard the Orbiter for ferry to the launch site via the SCA. However, because of non-primary landing site locations, weight, ~~e.g.,~~**CG,** safety considerations, or mission-unique requirements, portions or all of the MPLM may be removed from the Orbiter payload bay, de-integrated (if required), and transported in ~~ISSP~~**ISS Program**-provided shipping containers by the ~~ISSP~~**ISS Program** to the launch site.

The ~~ISSP~~**ISS Program** and the PD are responsible for the performance of payload-unique operations (data removal, safing, preparations for transporting, etc.) and will provide

the landing site personnel and GSE to conduct these operations. Within the transportation provisions for the SSP GSE and personnel, the SSP will provide, on a space-available basis, transportation of payload-unique GSE and personnel to and from the landing site. The ~~ISSP~~**ISS Program** will provide air transport to the payload ~~(ISSP Non-Standard Service)~~.

~~ISSP Non-Standard Services associated with an abort landing must be negotiated and documented in Section 1.3 of this EIA Addendum.~~

7.4.3 Early End of Mission support

An Early End of Mission (EEOM) occurs if a flight lands at KSC or DFRC before the planned EOM. In this case, the SSP shall remove and disposition the payload using its best efforts. If the payload requires EEOM support other than best effort, this support is an SSP non-standard service.

SSP Non-Standard Services associated with a EEOM support must be negotiated and documented in Section 1.3 of ~~the~~ **this** ~~EIA~~ Addendum **to this document**.

7.5 FERRY FLIGHT OPERATIONS

Reference SSP 57000, IRD, for MPLM ferry flight environment. Payloads inside the MPLM shall not impose unique Orbiter ferry flight requirements.

For payload planning purposes, nominal EOM ferry flight occurs approximately seven days after landing, with KSC arrival approximately nine days after landing.

SECTION 8, PROGRAM RESOURCES AND INTERFACES ~~COMMITMENTS~~

~~Section 8 of the EIA main volume documents the projected steady state resources and interfaces available to the payload during a typical year. These projections reflect an~~ **This** ~~allocation developed using the data as provided in the Payload's Mission Evaluation Request (MER)~~ **will reflect the operations concept of the payload during each of its stages and at assembly complete.** ~~The data collected in this section does not reflect actual resources to be received for a specific year. Specific resource allocations will be negotiated between the ISSP and the PD via the Increment-specific Addenda. The data also addresses special considerations that should be taken into account during payload development. Upon completion of the analyses and negotiations of the data in the MER~~ **Payload's Mission Evaluation Request (MER),** ~~the PD shall identify in the subsequent tables the steady state payload resource requirements and the ISS interface requirements.~~**Section 8 of the EIA main volume documents projected steady state resources available during a typical year and is used for project design guidance with strategic manifest planning. This data will replace the MER at completion of the preliminary document. The data will reflect the operations concept of the facility at each phase of incremental deployment.**

Specific resource allocation agreements for a payload in an increment will be documented in the EIA Addendum.

8.1 RESOURCE REQUIREMENTS

The contents of this section of the EIA list the **estimated** steady state resource requirements of the payload which will be used for ~~resource planning~~**program design guidance and resource strategic planning**. The ~~ISSP~~**ISS Program** will provide the resources needed to operate the payload.

The PD shall provide the following information in Table 8.1~~.1~~-1, **Estimated** Steady State Payload Resource Requirements. ~~**Explanatory notes shall be added as required identifying the basis of resource requirements calculations.**~~

A. On-Orbit Volume (~~locker/drawer~~ **payload** ~~equivalent volume,~~ **cubic meters**) - The volume required on-orbit for internal accommodations, including experiment and stowage volume. **# numeric, 99999.9999 max #**

B. Up Mass (kilograms per year) - The total payload and resupply mass to be launched in support of payload operations, including ~~locker/drawer~~ **payload structure**, special flight support equipment and logistics carriers, as appropriate. **# numeric, 99999.999 max #**

C. Down Mass (kilograms per year) - The total payload and resupply mass to be returned in support of payload operations, including ~~locker/drawer~~ **payload structure,** special flight support equipment and logistics carriers, as appropriate. **# numeric, 99999.999 max #**

D. Up Volume (~~Locker/Drawer~~ **payload equivalent** ~~volume,~~ **cubic meters, per year**) - The total payload and resupply volume to be launched in support of payload operations, including ~~locker/drawer~~ **payload structure**, special flight support equipment and logistics carriers, as appropriate. **# numeric, 99999.9999 max #**

E. Down Volume (~~Locker/Drawer~~**payload equivalent** ~~volume,~~ **cubic meters, per year**) - The total payload and resupply volume to be launched in support of payload operations, including ~~locker/drawer~~**payload structure**, special flight support equipment and logistics carriers, as appropriate. **# numeric, 99999.9999 max #**

F. Energy (kilowatt hours) - Total energy required per year for payload operations. **# numeric, 99999.999 max #**

G. Crew Time (hours per year) - Total crew time required per year for payload operations. **This includes nominal operations and maintenance operations activities. # numeric, 99999.999 max #**

H. Communications Downlink (terabits per year) - Total communications downlink required per year for payload operations. **# numeric, 9.9999E ± 99 max #**

I. Communications Uplink (terabits per year) - Total communications uplink required per year for payload operations. **# numeric, 9.9999E ± 99 max #**

J. Late/Early Access (launch/return/both/none) - Late and/or early access services required for payload or payload re-supply launch and return. **# select one from list #**

K. ~~Laboratory Support Equipment (list) - Laboratory Support, Station Support, and Payload Support equipment required to support payload operations.~~ **Support Equipment (list) – Laboratory Support and Station Support Equipment required for payload operations. Only Laboratory and Station Support Equipment that is critical to the operation of the rack system should be listed in Table 8.1-1. Laboratory Support Equipment and Station Support Equipment necessary for the science experiments will be defined in the EIA Addendum Tables 4.3.1-1 and 4.3.2-1. #character, 1000 max. #**

L. Other Coordinated Payloads (payload name) - List of ISS coordinated payload names, deletion of which will cause notification to the PD sponsoring this payload. **# character, 1000 max. #**

M. Additional Requirements (specify) - Special resource~~s required~~ **notes as needed** to ~~support~~ **explain** payload **support** ~~operations~~**requirements**. **# character, 1000 max. #**

~~TABLE 8.1.1-1 STEADY STATE PAYLOAD RESOURCE REQUIREMENTS~~

TABLE 8.1.~~1~~-1 ESTIMATED STEADY STATE PAYLOAD RESOURCE REQUIREMENTS

RESOURCES	RESOURCE REQUIREMENTS
On-Orbit Volume (**payload** ~~equivalent volume -~~ cubic **meters**)	
Up Mass (kilograms per year)	
Down Mass (kilograms per year)	
Up Volume (**payload** ~~equivalent volume -~~ cubic **meters** per year)	
Down Volume (**payload** ~~equivalent volume -~~ cubic meters per year)	
Energy (kilowatt hours per year)	
Crew Time (hours per year)	
Communications Downlink (terabits per year)	
Communications Uplink (terabits per year)	
Late/Early Access (launch/return/both/none)	
Support Equipment (list) **– Compound Microscope, Dissecting Microscope, Cryogenic Storage Freezer, Quick/Snap Cryogenic Freezer, Digital Thermometer, Micro Mass Measuring Device, Small Mass Measuring Device, Passive Dosimeter System**	
Other Coordinated Payloads (payload name)	
Additional Requirements (specify):	

*{~~Explanatory~~ **Additional Requirements** notes shall be added, as required, identifying the basis of resource requirements calculations}*

8.2 ISS STANDARD INTERFACE REQUIREMENTS

This section lists the ~~payload interfaces the EXPRESS Rack makes available to the PD~~ **modules within which the payload is capable of operating given the interfaces the ISS makes available to the payload. The PD shall design to be compatible with the modules selected in Table ~~8.2.1-1~~8.2-1, ISS Modules.**

TABLE 8.2-1 ISS MODULES

MODULE	COMPATIBLE (YES/NO)
U.S. Lab	
Japanese Experiment Module (JEM)	
Columbus Orbital Facility (COF)	
Centrifuge Accommodations Module (CAM)	

8.2.1 INTERFACE REQUIREMENTS

The PD shall provide the following information in Table 8.2.1-1, Interface Requirements.

A. Interfaces - Indicate which of the following interfaces are provided to support the operations of the payload. The individual interfaces are further described in SSP 52000-IDD-ERP.

TABLE 8.2.1-1 INTERFACE REQUIREMENTS

INTERFACES	REQUIRED (YES/NO)
Power	
500 W	
Data	
RS 422	
Ethernet	
PD Developed Software on EXPRESS Rack Laptop Computer	
5 Vdc discrete	
±5 Vdc analog	
Video	
Video from Payload to EXPRESS Rack (NTSC RS 170A)	
Video to Payload from ISS	
FDS/Maintenance	
Smoke Parameter Signals to EXPRESS Rack	
Gases	
Nitrogen	
Argon (Non-Standard)	
Helium (Non-Standard)	
Carbon Dioxide (Non-Standard)	
Vacuum Exhaust	
Vacuum Resource (Non-Standard)	
Cooling	
Moderate Temperature Loop	
EXPRESS Rack AAA Air System	
EXPRESS Rack with Active Rack Isolation System (ARIS)	
Aisle Mounted Hardware	

~~*1.1.1**ISS Modules/Payload Compatibility***~~

~~The PD shall select those modules in which the payload is capable of operating in Table 8.2.1-1, ISS Modules.~~

~~A. Module - The section of the ISS in which the payload will be designed to operate.~~

SECTION 9, GENERIC REVIEWS AND SCHEDULES

~~Below are the typical major payload integration data submittal milestones to be used for the pre-Assembly Complete payload processing period.~~ **Below is the Subrack Generic Payload Integration Schedule, depicting data submittal milestones to be used for the pre-assembly complete payload processing period.** ~~(~~Note: This schedule will be updated at a later date to reflect ~~the~~ **a** shorter standard EXPRESS template to be used in the post assembly complete timeframe.~~)~~ Top level increment-specific schedules negotiated between the ~~ISSP~~**ISS Program** and the PD are contained in ~~this~~ **Appendix D of the** EIA Addendum, ~~Section 8~~**and deviations are contained in Section 8 of the EIA Addendum.** Increment-specific schedules will be maintained in the ~~<**TBD 3-1**>~~ payload **integration** schedule.

Payload integration schedules will be developed on an increment and flight basis for the initial and all subsequent flights. The PD shall supply a payload readiness date for the first flight assuming a KSC on-dock date of Launch minus (L-) 6 months.

~~TABLE 9.0-1 GENERIC SCHEDULES~~

~~Data Submittals Generic Due Date~~

TABLE 9.0-1 GENERIC PAYLOAD INTEGRATION SCHEDULE (Sheet 1 of 2)

MILESTONE	SCHEDULE
EIA Main Volume Preliminary User Submit	**PDR**
EIA Main Volume Baseline User Submit	**CDR**
EIA Increment Addenda Preliminary Submit	PP-24 mo
EIA Increment Addenda Baseline Submit	PP-18 mo
EIA Increment Addenda Update	PP-12 mo
CoFR 1 EXPRESS Payload Inputs	L-15 weeks
CoFR 2 EXPRESS Payload Inputs	L-7 weeks
Phase 3 Flight Safety Review Data Package (DP) Submit	L-13.5 mo
Phase 3 Flight Safety Review	L-12 mo
Phase 3 Ground Safety Review Data Package (DP) Submit	L-7.5 mo
Phase 3 Ground Safety Review	L-6 mo
ICD Development	L-20 mo (Preliminary) L-18 mo (Baseline)
Verification Plan Development	L-20 mo (Preliminary) L-18 mo (Baseline)
Payload Configuration Data Set	**L-22 mo** (Preliminary) **L-18** mo (Baseline) **L-8 mo (Subkit Contents)**
Payload Command & Data Handling Data Set	L-16 mo (Preliminary) L-14 mo (Baseline)
KSC Technical Requirements Data Set	~~L-14.5 mo (Preliminary)~~
ISS to P/L OMRS File 8 Volume 2	L-6 **12.5** mo (~~Baseline~~**Preliminary**) **L-9 mo (Baseline)**
Orbiter Middeck to Payload OMRS File 2 Volume 2	**L-6 mo (Preliminary)** **L-3 mo (Baseline)**
Orbiter Middeck to Payload TGHR Table	**L-4.5 mo (Preliminary)** **L-2 mo (Baseline)**
KSC Support Requirements Data Set	**L-16 mo (Visibility)**
	L-~~14.5~~**12** mo (Preliminary) L-6 **9** mo (Baseline)
~~KSC Science Support Requirements Data Set~~	~~L-14.5 mo (Preliminary)~~ ~~L-6 mo (Baseline)~~

TABLE 9.0-1 GENERIC PAYLOAD INTEGRATION SCHEDULE (Sheet 2 of 2)

MILESTONE	SCHEDULE
Payload Application Software (Laptop)	L-11 mo (Final to PSIV)
Test Verified Finite Element Models	L-14 mo
Certificate of Compliances for Verification	L-6 mo
EMI Test Results	L-8.5 mo
Acoustics Test Results	L-8.5 mo
Payload Readiness Date (mm/dd/yy)	**L-6 mo**
Payload Hardware Turn over to KSC (MPLM) Payload Hardware Turn over to KSC (MDK)	L-5 mo (post Offline Testing) L-24 hrs. (Late Load)
Payload Training Data Set PSRD	Increment minus (I-) 24mo Draft PP-18 mo (Draft)
Ground Services Data Set	I-23 mo (Draft)
Payload Operations Data Set	I-18 mo (Preliminary) I-12 mo (**Final**)
Payload Planning Data Set	I-18 mo (Preliminary) I-6 mo (**Final**)
Payload Flight Procedures (via PIMS)	I-19 mo (Preliminary) I-7 mo (Baseline) I-4 mo (Final)
Payload Ground Malfunction Procedures (via PIMS)	I-14 mo (Preliminary) I-7 mo (Baseline) I-4 mo (Final)
Payload Systems Manual Inputs (via PIMS)	I-19 mo (Preliminary)

9.1 ~~ISSP~~**ISS PROGRAM** REVIEWS

Reviews will be conducted to assess the status of payload integration as described within SSP 52000-UG-ERP. The following reviews are to be supported by data and expertise from the PD as required.

	REVIEW	GENERIC DUE DATE
A.	EXPRESS Readiness Review (ERR)	L-12 months
B.	Station Cargo Integration Review (SCIR)	L-12 months
C.	Increment Operations Review (IOR)	I-4 months
D.	Periodic Payload Status Reviews	**I**-XX months
E.	Other specified ~~ISSP~~**ISS Program** Reviews	**I**-XX months
F.	Post-Increment Review (PIR)	R+1 months

9.2 EARTH-TO-ORBIT VEHICLE REVIEWS

	REVIEW	GENERIC DUE DATE
A.	Payload Readiness Review (PRR)	L-6 weeks
B.	Cargo Integration Review (CIR)	L-10 months
C.	Flight Operations Review (FOR)	L-4 months
D.	Flight Readiness Review **(FRR)**	L-2 weeks
E.	Launch Minus 2-Day Review **(L-2)**	L-2 days

9.3 JOINT ISSP/EARTH-TO-ORBIT VEHICLE REVIEWS

	REVIEW	GENERIC DUE DATE
A.	Payload Safety Reviews (PSRs)	L-12 months
	(1) Joint Safety Reviews (SRs)	L-12 months
	(2) Ground Review	L-12 months
B.	Ground Operation Review (GOR)	L-7 months

~~SECTION 10, PAYLOAD-UNIQUE EIA MAIN VOLUME CHANGES~~

~~The EIA Main Volume contains generic requirements and agreements which are derived from the ISSP approved EIA Blank Book, SSP 52000-EIA-ERP. To be enforced, payload-unique changes to the basic wording of the EIA must be noted in Table 10.1-1, Payload-Unique Changes to the EIA Blank Book, and agreed-to by the ISSP.~~

~~10.1 PAYLOAD-UNIQUE CHANGES~~

~~The PD shall list in Table 10.1-1 any paragraphs where the generic wording of the EIA Main Volume have been updated to reflect payload-unique requirements.~~

~~TABLE 10.1-1 PAYLOAD-UNIQUE CHANGES TO THE EIA BLANK BOOK~~

~~PARAGRAPH NUMBER~~	~~CHANGE~~
	~~*[Describe]*~~

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APPENDIX A

ABBREVIATIONS AND ACRONYMS

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APPENDIX A, ABBREVIATIONS AND ACRONYMS

~~Add.~~	~~Addendum~~
ANX	**Annex**
ARC	Ames Research Center
~~ARIS~~	~~Active Rack Isolation System~~
ASC	Aisle Stowage Container
~~C~~	~~Centigrade~~
c.g.	center of gravity
~~CAM~~	~~Centrifuge Accommodations Module~~
CBT	Computer Based Trainer
CDR	**Critical Design Review**
CE	**Cargo Element**
CEIT	Crew Equipment Interface Test
CIR	Cargo Integration Review
~~CITE~~	~~Cargo Integration Test Equipment~~
CM	Configuration Management
~~CO_2~~	~~Carbon Dioxide~~
~~COF~~	~~Columbus Orbital Facility~~
CoFR	Certification of Flight Readiness
CTC	**Crew Training Coordinator**
DC	Direct Current
DFRC	Dryden Flight Research Center
~~DLA~~	~~Design Loads Analysis~~
DoD	Department of Defense
DP	Data Package
DQA	**Document Quality Assurance**
EEOM	Early End of Mission
EIA	EXPRESS Integration Agreement
EMC	**Electromagnetic Conductance**
EMI	Electromagnetic Interference
EOM	End of Mission
EPIM	EXPRESS Payload integration Manager
ERO	EXPRESS Rack Office
ERP	**EXPRESS Rack Payload**
ERR	EXPRESS Readiness Review
ETOV	Earth-To-Orbit Vehicle

ETR	**EXPRESS Transportation Rack**
EXPRESS	Expedite the PRocessing of Experiments to Space Station
FCR	Flight Control Room
~~FCU~~	~~Functional Checkout Unit~~
FDF	**Flight Data File**
~~FDS~~	~~Fire Detection System~~
FOR	Flight Operations Review
FRR	Flight Readiness Review
~~ft^3~~	~~cubic feet~~
GFE	**Government-Furnished Equipment**
GOR	Ground Operations Review
GSE	Ground Support Equipment
GSP	Ground Support Personnel
GSR	**Ground Safety Review**
GSRP	**Ground Safety Review Panel**
HB	**Handbook**
HOSC	**Huntsville Operations Support Center**
HRMRB	**Human Research Multilateral Review Board**
Hrs	**hours**
I-	Increment minus
IACUC	Institutional Animal Care and Use Committee
ICD	Interface Control Document
~~ID~~	~~Identification~~
IDD	Interface Definition Document
IDRD	**Increment Definition and Requirements Document**
IGA	**Intergovernmental Agreement**
IOP	Increment Operations Plan
IOR	Increment Operations Review
~~IP~~	~~International Partner~~
IRB	Institutional Review Board
IRD	**Interface Requirements Document**
~~ISIS~~	~~International Subrack Interface Standard~~
ISPR	International Standard Payload Rack
ISS	International Space Station
~~ISSP~~	~~International Space Station Program~~
iURC	**interim User Requirements Collection**

IVA	**Intravehicular Activity**
JEM	**Japanese Experiment Module**
JMST	**Joint Mission Simulation Test**
JSC	Johnson Space Center
~~kg~~	~~Kilograms~~
KHB	Kennedy Space Center Handbook
KSC	Kennedy Space Center
~~kw~~	~~Kilowatt~~
kwh	**Kilowatt hours**
L	Launch
L-	Launch minus
~~L&L~~	~~Launch and Landing~~
~~lb~~	~~pound~~
~~Lab~~	~~Laboratory~~
LSE	Laboratory Support Equipment
LSSM	Launch Site Support Manager
LSSO	Launch Site Safety Office
~~m^3~~	~~cubic meters~~
~~Mbps~~	~~Megabytes~~ **Megabits** ~~per second~~
Max	**Maximum**
MCC-H	Mission Control Center - Houston
~~MDD~~	~~Mate/Demate Device~~
MDK	Middeck
MDL	Middeck Locker
~~MDLE~~	~~Middeck Locker Equivalent~~
MDM	Multiplexer/Demultiplexer
MER	Mission Evaluation Request
~~**MELFI**~~	~~**Minus Eighty Degree Laboratory Freezer for ISS**~~
~~MIP~~	~~Mission Integration Plan~~
mo	Month
MORD	Medical Operations Requirements Document
~~MPLM~~	~~Mini-Pressurized Logistics Module~~
MPLM	**Multi-Purpose Logistics Module**
MSDS	**Material Safety Data Sheets**

N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NIH	National Institute of Health
NPTIP	NASA Payload Training Implementation Plan
NSTS	National Space Transportation System
~~NTCS~~	~~National Television Standards Committee~~
OMRS	**Operations and Maintenance Requirements and Specifications**
OMS	**Orbital Maneuvering System**
OPF	Orbiter Processing Facility
OPMS	**On-Line Project Management System**
ORGN	**Organization**
ORU	**Orbital Replacement Unit**
~~pH~~	~~value used to express acidity and alkalinity~~
~~P~~	~~Powered~~
~~P/L~~	~~Payload~~
PAH	Payload Accommodations Handbook
PCB	Payloads Control Board
PD	Payload Developer
PDL	Payload Data Library
PDR	**Preliminary Design Review**
PDS	**Payload Data Sets**
PDRP	**Payload Display Review Panel**
PDSS	Payload Data Services System
PEP	**Payload Executive Processor**
PFE	**Program-Furnished Equipment**
PIA	**Payload Integration Agreement**
PIDS	**Prime Item Development Specification**
PIM	**Payload Integration Manager**
PIMS	Payload Information Management System
PIR	Post-Increment Review
PLBD	**Payload Bay Door**
PL OOS	Payload On-Orbit Operations Summary
POC	**Point of Contact**
~~POD~~	~~Payload Operations Director~~
PODF	Payload Operations Data File
POIC	Payload Operations Integration Center
POIF	Payload Operation Integration Function
POIWG	Payload Operations Integration Working Group
PP-	Planning Period minus

PRCU	**Payload Rack Checkout Unit**
~~PRP~~	~~Pressurized Payloads~~
PRR	Payload Readiness Review
PSE	**Payload Support Equipment**
PSIV	Payload Software integration and Verification
~~PSM~~	~~Payload Systems Manual~~
PSR	Payload Safety Review
PSRD	Payload Simulator Requirements Document
PSRP	Payload Safety Review Panel
PTC	Payload Training Center
PTCS	Payload Test and Checkout System
PTI	**Payload Training Integrator**
~~PTIM~~**PTI**	~~Payload Training Integration Manager~~**Payload Training Integrator**
PUDG	**Payload Users Development Guide**
PVP	**Payload Verification Plan**
PWQ	**Process Waste Questionnaire**
~~QA~~	~~Quality Assurance~~
~~**QD**~~	~~**Quick Disconnect Connector**~~
~~R+~~	~~Return plus~~
~~RS~~	~~Recommended Standard~~
RM&QA	**Reliability, Maintenance and Quality Assurance**
~~SCA~~	~~Shuttle Carrier Aircraft~~
SCIR	Station Cargo Integration Review
~~ScS~~	~~Suitcase Simulator~~
SIP	**Standard Integration Plan**
SLF	Shuttle Landing Facility
SPW	**System Payload Workbook**
SR	Safety Review
SRB	**Solid Rocket Booster**
SSE	Station Support Equipment
SSP	Space Shuttle Program
~~SSPF~~	~~Space Station Processing Facility~~
~~SSPO~~	~~Space Station Payloads Office~~
~~SSTF~~	~~Space Station Training Facility~~
STD	**Standard**
STS	Space Transportation System
~~**T/O**~~	~~**Turn Over**~~

TBD	To Be Determined
TBR	To Be Resolved
TGHR	**Time-Critical Ground Handling Requirements**
TOP	Technical Operating Procedure
TSC	Telescience Support Center
TSE	Test Support Equipment
TST	Training Strategy Team
UG	Users Guide
~~UP~~	~~Unpowered~~
U.S.	United States
URC	User Requirements Collection
USOC	United States Operations Center
USOS	**United States On-Orbit Segment**
~~VAB~~	~~Vehicle Assembly Building~~
~~Vdc~~	~~Volt(s) direct current~~
~~VITO~~	~~Vehicle Integration Test Office~~
~~VLA~~	~~Verification Loads Analysis~~
~~W~~	~~Watts~~
~~wks~~	~~weeks~~

APPENDIX B

GLOSSARY OF TERMS

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APPENDIX B, GLOSSARY OF TERMS

Accommodations - Applies to ETOV or ISS physical locations where utilization or system items are stowed or installed.

Aisle Stowage Container (ASC) - The ASC is designed to provide additional stowage volume transport capability inside the MPLM and may include oversized hardware that cannot be transported inside a standard transportation rack.

Allocation - The portioning of resources and accommodations between the ISS payload/ experiment users and ISS systems.

Ascent – The period of time from Solid Rocket Booster (SRB) ignition through the establishment of a stable orbit (typically post-Orbital Maneuvering System (OMS) second burn).

Data Sets - Data sets contain the engineering, integration, and operational details required and agreed-upon by the implementing organizations. Data sets define, on an increment and flight-specific basis, the engineering, integration, and operational details of the requirements in the Addendum. Data sets will be updated as agreed-to by the implementing organizations to meet increment and flight-specific needs.

Descent – The period of time from start of preparation for entry through wheel stop.

Drawer - The term "drawer" as used in the text of this document refers to a 4 panel unit ISIS drawer, which can operate in an 8/2 configuration EXPRESS Rack. These 4 panel unit drawers are compliant with the ISIS drawers specification. The 4 panel unit drawer will be transported to the ISS unpowered in an EXPRESS Rack or EXPRESS Transportation Rack. The drawers will be returned unpowered from the ISS using the EXPRESS Transportation Rack.

~~**During Ascent - Time from launch to docking, excluding the time required immediately after launch and before docking.**~~

Early On-Orbit - The time from docking to completion of payload transfer.

EXPRESS Rack - The EXPRESS Rack provides standard accommodations and services for subrack science payloads which will allow them to access the research capabilities of the ISS. The EXPRESS Rack consists of an International Standard Payload Rack (ISPR) which has been modified with power, data, and cooling subsystems which support the small locker and drawer (subrack) type payloads.

EXPRESS Transportation Rack - The EXPRESS transportation rack is a standard ISPR which has been modified to physically accommodate locker and drawer type payloads. The transport racks are launched and returned in the MPLM.

Facility Class Payloads - A long-term or permanent ISS resident that provides services and accommodations for experiments in a particular science discipline.

Flight - The time phase and the sequence of events that take place between liftoff and entry/landing of an ETOV.

High-Fidelity Crew Interfaces - Simulator interfaces for the crew which closely emulate the actual flight payload design in terms of hardware and software functionality.

Increment (I) - A specific time period into which various assembly, discipline research, testing, logistics, maintenance, and other ISS system operations and utilization activities are grouped. Currently the increments are defined by crew rotation.

Integrated Rack Payload - A payload which is considered a subrack payload and will be located in a rack such as the EXPRESS Rack.

International Standard Payload Rack (ISPR) - The International Standard Payload Rack (ISPR) accommodates approximately 55.7 ft^3 (1.58 m^3) and 56.3 ft^3 (1.59 m^3) of payload equipment with and without the center posts installed respectively. The rack accommodates up to 80**4**~~2~~ kg of payload equipment with structural augmentation during launch/landing and ground handling.

ISPR Transportation Rack Standard Stowage Trays - The standard stowage units are modular trays which are installed in the standard transportation stowage racks. There are 11 different configurations of the trays.

~~**ISSP Non-Standard Services<TBD A.1-1>**~~

~~**ISSP**~~**ISS Program Standard Services** - Those services as negotiated and documented in the KSC Technical Requirements and KSC support requirements data sets. ~~**<TBD B-1>**~~

Laboratory Support Equipment (LSE) - LSE are devices that are shared on a non-interference basis by multiple research users. LSE varies in size and complexity from a simple thermometer to full size ISPR containing a refrigerator/freezer.

Locker - The term "locker" as used by itself in the text of this document refers to a Space Transportation System (STS) middeck locker or middeck locker equivalent (i.e., a locker compliant with the physical dimensions as defined in STS 21000-IDD-MDK, Shuttle/Payload Interface Definition Document for

Middeck Accommodations). The lockers will be transported to the ISS. Unpowered in an EXPRESS Rack, EXPRESS transportation rack, or STS middeck; or powered in the STS middeck only. The lockers will be returned from the ISS. Unpowered in an EXPRESS transportation rack or STS middeck, or powered in the STS middeck only.

Offline Processing – Offline refers to payload stand alone activities or procedures initiated and performed by the PD to checkout or prepare hardware prior to turnover to KSC.

Online Processing – Online refers to integrated activities or in procedures initiated and performed by KSC to integrate payload hardware and to perform a functionality test after payload turnover to KSC.

On-Orbit – The period of time between the completion of ascent and the start of descent.

Payload Developer (PD) - The engineering team/principal investigator or organization responsible for the development and management of the payload.

Payload Support Equipment (PSE) - **PSE is equipment that is to be used for a specific payload. It is provided by the specific payload and is not available for multi-use.**

Rack Level Payload - **The rack as a facility or non-integrated container is the rack level payload. Once the rack level payload is joined with the subrack payloads, it becomes an integrated rack payload.**

Refrigerators and Freezers - The ISS will have several different types of refrigerator/freezers onboard that will be available for sample thermal stowage by PDs and experimenters.

Resources - This is the term used to identify a particular subset of ISS on-orbit capabilities used in support of system and payload operations. Resources include but are not limited to power, crew time, etc.

Shuttle Middeck Accommodations - Modular lockers are available on the Space Shuttle to accommodate PD experiments and experiment hardware.

SSP Non-Standard Services - Those services are tasks outside the scope of the standard SSP services but which are performed by NASA for a customer. These services are commonly performed for individual payloads to accomplish complex or unique mission requirements. SSP non-standard services are provided at no additional cost to the PD.

SSP Standard Services - Those services provided to all customers for transportation of payloads to and from ISS.

Station Support Equipment (SSE) - **SSE are devices/equipment which are owned by the station. Payloads may request use of devices/equipment prior to launch of the payload. The use of the SSE will be negotiated through the LSE PIM.**

Subrack Level Payload - **A subrack level payload is one of several payloads that are located in an integrated rack such as EXPRESS Rack. These payloads are part of the combined rack payload and must meet the subrack development/ integration schedules provided by the EXPRESS Rack.**

APPENDIX C

OPEN WORK

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APPENDIX C, OPEN WORK

Table C-1 lists ~~the specific items in the document that are not yet known~~**To Be Determined (TBD) items in this document**. ~~The TBD~~ **Each** item is ~~numbered based on the applicable~~ **given a TBD number using** the section of the document ~~(where the TBD item is located)~~ **that contains the item** as the first digit and a consecutive number for the second digit. The TBD ~~is inserted at that location in bold type within brackets (i.e., <TBD 4-1> is the first undetermined item in Section 4 of the document)~~ **number is listed along with the affected section and a description of the item**. As each TBD item is resolved, the updated text is inserted in place of the TBD in the document and the entry is removed from this table. ~~As new TBD items are assigned or existing TBD items are determined, original TBDs will not be renumbered.~~

TABLE C-1 TO BE DETERMINED ITEMS

NUMBER	DESCRIPTION	SECTION	ASSIGNEE	DUE DATE	STATUS
1-1	Document number for Public Affairs Plan.	1.4, 2.1	Jim Scheib	12/9**9**	Open
6-3	User Training/Certification Plan.	2.2, ~~6.1.2, 6.1.3~~**6.1.2.2 I**	**D. Sander**	12/9**9**	Open
6-4	Ground Malfunctions Book.	2.2, 6.1.3.1B	**D. Sander**	12/9**9**	Open
6-5	Payload System Manual.	2.2, 6.1.3.2A	**D. Sander**	12/9**9**	Open
6-6	Payload Operations Handbook.	2.2, 6.1.3.2A	**D. Sander**	12/9**9**	Open
6-7	Payload Regulations (POIC).	~~2.1~~**2.2**, 6.1**B**, 6.1.3.2B	**D. Sander**	12/9**9**	Open
6-8	Document containing facility capabilities and requirements.	2.2, 6.1.6	**D. Sander**	12/9**9**	Open
6-9	Document containing Preflight and Post-flight crew time requirements and facility usage requirements.	2.2, 6.1.6	**D. Sander**	12/9**9**	Open
~~6-10~~	~~Document number for Payload Reliability Maintainability and Quality Assurance Generic Requirements.~~	2.2, 3.3.2~~K~~**L**	Dan Hartman	12/9**9**	Open
~~A.1-1~~	~~SSP Non-Standard Services.~~	~~Apx B~~	~~Jim Scheib~~	~~12/99~~	~~Open~~
~~B-1~~	~~ISSP Non-Standard Services definition.~~	~~Apx B~~	~~Jim Scheib~~	~~12/99~~	~~Open~~

Table C-2 lists ~~unresolved issues within the~~ **To Be Resolved (TBR) items in this** document. ~~The TBR issue is numbered based on the applicable~~ **Each item is given a TBR number using the** section of the document ~~(where the TBR issue is located)~~ **that contains the item** as the first digit and a consecutive number for the second digit. The TBR ~~is inserted at that location in bold type within brackets (i.e., <TBR 4-1> is the first unresolved issue in Section 4 of the document)~~ **number is listed along with the affected section and a description of the item**. As each TBR **issue** is resolved, the ~~updated~~ **correct** text is inserted **in place of the TBR in the document** and the entry is removed from this table. ~~As new TBR items are assigned or resolved, original TBRs will not be renumbered.~~

TABLE C-2 TO BE RESOLVED ISSUES

NUMBER	DESCRIPTION	SECTION	ASSIGNEE	DUE DATE	STATUS
6-2	Baseline Data Collection	6.1.6	**D. Sander**	12/9**9**	On-going assessment

~~APPENDIX D~~

~~REQUEST FOR RESOURCES AND ACCOMMODATIONS~~

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APPENDIX D - REQUEST FOR RESOURCES AND ACCOMMODATIONS

Appendix D, Request for Resources and Accommodations, documents the operations concept of the payload facility during each stage and at Assembly Complete. This data will be used to develop the projected allocations found in Section 8, Program Resource and Interface Commitments. The data collected in this section reflect the average resources required to implement the operations concept of this facility. Specific resource allocations will be negotiated between the ISSP and the PD and documented in the increment-specific addenda. The data also addresses special considerations that should be taken into account during payload development. The PD will identify in the subsequent tables: the steady state payload resource requirements and the ISS interface requirements. After analysis and negotiation of these parameters, the PD will identify their resource allocations and interface requirements in Section 8.

D.1 HARDWARE TRANSPORTATION REQUIREMENTS

The PD shall provide the following information for ascent and descent in Tables D.1-1, Hardware Transportation Requirements Up (Ascent) and Table D.1-2, Hardware Transportation Requirements Down (Descent).

A. Requested Flight Date - The requested date to launch payload hardware.

B. Hardware Item (Name) - The payload-provided hardware item(s) to be transported to the ISS (e.g., samples, tools, payload-provided experiment units etc.).

C. Mass - The mass of the payload items listed including the mass of any payload-provided carriers or payload-dedicated ISSP carriers.

D. Volume - The volume of the payload items. If the payload carrier is a single or double MDL or Middeck Locker Equivalent (MDLE), or a ISIS drawer, this cell may be left blank.

E. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload to the ISS. The locker may be an ISSP-provided MDL or a payload-provided MDLE. For lockers, specify Powered (P) or Unpowered (UP) by the locker designation (example: MDL (UP), MDLE (P), etc.). If the payload carrier is not known, this cell should be left blank pending analysis to determine the appropriate payload carrier.

Single MDL *(ISSP-provided)*	Single MDLE *(PD-provided)*	Double MDLE *(PD-provided)*	Other

4-panel-unit ISIS Drawer	ASC/Softpack	Undefined (loose items)	
+4 °C Refrigerator	-20 °C Freezer	-80 °C Freezer	-183 °C Cryo Freezer

F. Payload Carrier Location - Payload Carrier Location - The required location of the payload carrier (e.g., MDK, MPLM, Not Applicable (N/A) (no requirement), etc.).

G. Additional Information - Information such as unique shapes and sizes, hazardous materials, etc., which might be pertinent to the ISSP.

TABLE D.1-1 HARDWARE TRANSPORTATION REQUIREMENTS UP (ASCENT)

REQUESTED FLIGHT DATE	HARDWARE ITEM	MASS (KG)	VOLUME (M^3)	CARRIER (IF KNOWN)	LOCATION (IF KNOWN)	ADDITIONAL INFORMATION

TABLE D.1-2 HARDWARE TRANSPORTATION REQUIREMENTS DOWN (DESCENT)

REQUESTED FLIGHT DATE	HARDWARE ITEM	MASS (KG)	VOLUME (M^3)	CARRIER (IF KNOWN)	LOCATION (IF KNOWN)	ADDITIONAL INFORMATION

D.2 PAYLOAD OPERATION DESCRIPTION

The PD shall provide the following information:

Brief description of how the payload will be operated. Identify any other payloads that need to be co-manifested or available on-orbit to support this payload's operation.

TABLE D.2-1 PAYLOAD OPERATION

PAYLOAD/OPERATION

D.3 ASCENT/DESCENT POWER REQUIREMENTS

The PD shall provide the following information:

Ascent/Descent Power - Average power required by the payload during ascent and descent.

TABLE D.3-1 ASCENT/DESCENT POWER REQUIREMENTS

Power Requirement (kw)
Ascent Power:
Descent Power:

D.4 ASCENT/DESCENT THERMAL REQUIREMENTS

The PD shall provide the following information:

Ascent/Descent Thermal Requirements - State the average heat rejection required by the payload during ascent and descent and describe heat removal technique (front/rear blowing middeck locker, passive, etc.).

TABLE D.4-1 ASCENT/DESCENT THERMAL REQUIREMENTS

AIR COOLING	ASCENT (KW)	DESCENT (KW)
[Describe]		

D.5 LATE INSTALLATION/EARLY RETRIEVAL REQUIREMENTS

The PD shall provide the following information:

State the payload's late and/or early access required. Include the specific time required before launch for late access and the specific time required after landing for early access and the duration expected for installation/removal of the payload. Describe the installation/removal procedure.

TABLE D.5-1 LATE INSTALLATION/EARLY RETRIEVAL REQUIREMENTS

Late Installation/Servicing:	Yes ☐ No ☐	If yes, Launch minus "x" hours: L-_____ hours	Installation Duration: _____ minutes
Early Payload Removal:	Yes ☐ No ☐	If yes, Landing plus "x" hours: L+_____ hours	Removal Duration: _____ minutes

D.6 TYPICAL ON-ORBIT OPERATING CYCLE REQUIREMENTS

These requirements, in conjunction with "typical operating cycle resource requirements" described below, are used to estimate total payload operating resource needs. "Typical" is used in the sense of "average," with the understanding that actual investigations may exceed or not exceed the "average" resource requirements given, but that "on the average," if these resources are provided, they will meet the operational objectives of the payload.

The PD shall provide the following information:

Typical Operating Cycle Duration - The average duration of one nominal payload operation performance of the payload, in hours.

Typical Operating Cycle Frequency - The number of payload operation performances required per year.

Total Operating Cycles - The total number of payload operation performances required before payload is to be returned to Earth.

Minimum Acceptable Number of Operating Cycle Performances - The minimum number of operating cycles needed to provide useful experiment information.

Maximum Time to Complete Total Operating Cycles - Any time limit that must not be exceeded before the completion of payload operations.

Minimum Time Between Operating Cycles - The minimum amount of time required between payload operating performances, in hours.

Special Operating Cycle Scheduling Requirements - Explain any special scheduling requirements that may exist related to, for instance, crew rotations, microgravity periods, viewing opportunities, external contamination levels, vehicle proximity operations, debris proximity situations, solar activity alerts, etc.

TABLE D.6-1 TYPICAL ON-ORBIT OPERATING CYCLE REQUIREMENTS

Typical Operating Cycle Duration (hours):	
Typical Operating Cycle Frequency (operating cycles/year):	
Total Operating Cycles Required before Payload Returns (number):	
Minimum Acceptable Number of Operating Cycle Performances (number):	
Maximum Time to Complete Total Operating Cycles (months):	
Minimum Time Between Typical Operating Cycles (hours):	
Special Operating Cycle Scheduling Requirements:	

D.7 PER OPERATING CYCLE ON-ORBIT OPERATIONS REQUIREMENTS

The PD shall provide the following information:

Peak Quantity Requirements - The peak amount of the resource required in the specified units.

Peak Duration Requirements - The average duration for the associated peak amount requirements, in hours per payload operation performance.

Off-Peak Quantity Requirements - The average off-peak amount of the resource required in the specified units.

Off-Peak Duration Requirements - The average duration for the associated off-peak amount requirements, in hours per payload operation performance.

TABLE D.7-1 PER OPERATING CYCLE ON-ORBIT OPERATIONS RESOURCES REQUIREMENTS

RESOURCE	UNITS	PEAK REQUIREMENT		OFF-PEAK REQUIREMENT	
		QUANTITY (SEE UNITS)	DURATION (HOURS)	QUANTITY (SEE UNITS)	DURATION (HOURS)
Power	kW				
Keep-Alive Power (minimum power to prevent experiment loss during emergency situations)	kW	N/A	N/A		N/A
Heat Rejection Air? Yes ☐ No ☐	kW				
Heat Rejection Cold Plate? Yes ☐ No ☐	kW				
Operating Temperature	°C				
Data Uplink	Mbps				
Data Downlink	Mbps				
Video Uplink	NTSC	N/A		N/A	
Video Downlink	NTSC	N/A		N/A	
Crew Support	# Persons				
Crew Subject	# Persons				

D.8 PER OPERATING CYCLE RESUPPLY USAGE AND PRODUCT GENERATION

The PD shall provide the following information:

Mass - Specify the resupply/product mass of the stowage for each container required for each payload operation performance.

Volume - Specify the resupply/product volume of the stowage for each container required for each payload operation performance.

TABLE D.8-1 PER OPERATING CYCLE RESUPPLY USAGE AND PRODUCT GENERATION

STORAGE TYPE	RESUPPLY (ASCENT)		PRODUCT (DESCENT)	
	MASS (kg)	VOLUME (m^3)	MASS (kg)	VOLUME (m^3)
Passive				
Waste	N/A	N/A		
+4 °C Refrigerator				
-20 °C Freezer				
-80 °C Freezer				
-183 °C Cryofreezer				
Incubator °C				

D.9 PER OPERATING CYCLE CONSUMABLE REQUIREMENTS

The PD shall provide the following information:

Specify the amount of the selected ISS consumable required for each payload operation.

TABLE E.9-1 PER OPERATING CYCLE CONSUMABLE REQUIREMENTS

PER OPERATING CYCLE ISS-PROVIDED CONSUMABLES	VOLUME (KG/OPERATING CYCLE)
Gaseous Nitrogen (GN_2)	
Argon (Ar)	
Helium (He)	
Carbon Dioxide (CO_2)	
Potable Water	

~~D.10 MICROGRAVITY REQUIREMENTS~~

~~The PD shall provide the following information:~~

~~Payload Vibration Sensitivities - Explain payload sensitivities to vibrations in terms of magnitude, frequency, direction, and duration.~~

~~Payload Steady-State Acceleration Sensitivities - Explain payload sensitivities to constant, or near-constant accelerations in terms of magnitude, direction, and duration.~~

~~TABLE D.10-1 MICROGRAVITY REQUIREMENTS~~

~~PAYLOAD VIBRATION SENSITIVITIES~~	~~PAYLOAD STEADY-STATE ACCELERATION SENSITIVITIES~~

D.11 PAYLOAD SUPPORT EQUIPMENT

The PD shall provide the following information:

Select the Payload Support Equipment that is required for payload operation.

TABLE D.11-1 PAYLOAD SUPPORT EQUIPMENT

[Check required equipment]

+4 °C Refrigerator ☐	DC Power Supply ☐	Housekeeping Equipment ☐	Portable Computer System ☐
-20 °C Freezer ☐	Digital Multimeter ☐	Incubator ☐	Restraints and Mobility Aids ☐
-80 °C Freezer ☐	Digital Recording Oscilloscope ☐	Maintenance Work Area ☐	Station Support Computer ☐
Bar Code Reader ☐	Digital Still Camera ☐	Mass Measuring Device, Micro ☐	Utility Outlet Panel ☐
Battery Charger ☐	Digital Storage Oscilloscope ☐	Mass Measuring Device, Small ☐	Other: *[List other required equipment]* ☐
Camera Locker ☐	Digital Thermometer ☐	Microgravity Barrier ☐	☐
Camera, High Resolution Video ☐	Freezer, Cryogenic Storage ☐	Microscope, Compound ☐	☐
Camera, Standard Video ☐	Freezer, Quick/ Snap Cryogenic ☐	Microscope, Dissecting ☐	☐
Camera, Still ☐	Function/Sweep Generator ☐	Passive Dosimeter Reader/Annealer ☐	☐
Cleaning Equipment ☐	General Purpose Hand Tools ☐	pH Meter/Ion Specific Analyzer ☐	☐

D.12 TRAINING

The PD shall provide the following information:

Crew Training Requirements:

2.0 Advanced training is not flight-specific and begins 24 months prior to the increment.

2.1 Increment-specific training is flight-specific and begins 18 months prior to the increment.

2.2 SSTF/PTC training uses the Integrated Simulator at the Space Station Training Facility's Payload Training Center and begins 12 months prior to the increment.

A. Crew training will occur at JSC unless a waiver is granted to allow for training at other facilities for special circumstances.

TABLE D.12-1 CREW TRAINING REQUIREMENTS

TRAINING CLASSIFICATION	TRAINING HOURS	TRAINING TIMEFRAME
Payload Orientation (including science background, systems overview, and operations overview)		
Payload Operations (including nominal operation and malfunction operations)		
Science Applications (hands-on training on science skills to support payload)		
Payload Transfer (operations to transfer and checkout equipment between transport vehicle and ISS)		
Payload Transport (operations required while payload is on the transport vehicle)		
Other		

D.13 OTHER OPERATING REQUIREMENTS

The PD shall provide the following information in Table D.13-1, Other Operating Requirements:

Specify whether payload operations require the use of the Vacuum Exhaust System, require venting of waste gases, or require other special services.

TABLE D.13-1 OTHER OPERATING REQUIREMENTS

PAYLOAD OPERATIONS	**YES**	**NO**
Requires Vacuum Exhaust System?		
Other:		

D.14 ADDITIONAL INFORMATION

The PD shall provide the following information in Table D.14-1, Additional Information:

Provide any additional information that you feel is necessary to ensure the safe and efficient transportation and operation of your payload.

TABLE D.14-1 ADDITIONAL INFORMATION

ADDITIONAL INFORMATION

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INTERNATIONAL SPACE STATION PROGRAM

ADDENDUM
TO
{PAYLOAD-UNIQUE EIA DOCUMENT NUMBER}
FOR
INCREMENT {INCREMENT NUMBER}

PREFACE

ADDENDUM TO {PAYLOAD-UNIQUE EIA DOCUMENT NUMBER} FOR INCREMENT{INCREMENT NUMBER}

This increment-unique Addendum is the agreement between the {**Research ~~Project~~Program Office or Appropriate Office or** Payload Developer (PD)} and the International Space Station **(ISS)** Program ~~(ISSP)~~ on the increment-specific responsibilities and tasks which relate directly to integration of the payload into the ~~International Space Station (~~ISS~~)~~. Signature on this Addendum constitutes technical agreement on the tasks to be performed.

[Any instructional information contained in this EIA Blank Book is enclosed in brackets [example]. Information to be supplied is enclosed in braces and underlined {example}. *All instructional information will be removed for the Increment-specific Addendum.]* ***Specific information relative to the data input fields in PDL is enclosed by the symbols #, # example #.***

All commitments and services to be furnished by the ~~ISSP~~**ISS Program** to the {**Research ~~Project~~Program Office or Appropriate Office or** Payload Developer (PD)} under this EXPRESS Integration Agreement (EIA) shall be furnished using its best efforts.

~~The flight dates shown in this EIA are for planning purposes only.~~

This Addendum, when baselined, becomes the controlling document for payload resources for an increment, superseding any previously agreed-to payload mission evaluation request~~ or Appendix D Inputs located in this EIS~~.

The abbreviations and acronyms list is found in Appendix A. The glossary of the terms requiring definition is found in Appendix B. Open items which have not been determined are designated as To Be Determined (TBD) and are found in Appendix C. Items which need to be resolved will be designated as To Be Resolved (TBR) and are also found in Appendix C.

Tables with shaded blocks require no payload data to be entered in those blocks.

The page numbers for this Addendum are documented by using the following format for A/{IX} - X-X:

A = Addendum
{IX} = Increment Number
X-X = Section/Page Number

INTERNATIONAL SPACE STATION PROGRAM

ADDENDUM
TO
{PAYLOAD-UNIQUE EIA DOCUMENT NUMBER}
FOR
INCREMENT {INCREMENT NUMBER}

CONCURRENCE

{MONTH DD, YYYY}

Approved by:	Mike Suffredini	OZ
	PAYLOADS OFFICE MANAGER	ORGN
	SIGNATURE	DATE
Approved by:	Teresa B. Vanhooser	FD31
	PAYLOAD DEVELOPER (PD)	ORGN
	SIGNATURE	DATE
Concurred by:	James Scheib	OZ2
	MANAGER, PAYLOAD MISSION PLANNING AND INTEGRATION	ORGN
	SIGNATURE	DATE
Concurred by:	Daniel Hartman	OZ3
	MANAGER, HARDWARE AND SOFTWARE ENGINEERING INTEGRATION AND PLANNING	ORGN
	SIGNATURE	DATE

INTERNATIONAL SPACE STATION PROGRAM

ADDENDUM
TO
{PAYLOAD-UNIQUE EIA DOCUMENT NUMBER}
FOR
INCREMENT {INCREMENT NUMBER}

CONCURRENCE

{MONTH DD, YYYY}

Concurred by:	Ned Penley	OZ4
	MANAGER, RESEARCH MISSION MANAGEMENT	ORGN
	SIGNATURE	DATE
Concurred by:	Doug Sander	OZ5
	MANAGER, UTILIZATION	ORGN
	SIGNATURE	DATE
Prepared by:	Carole McLemore	FD31
	EXPRESS PAYLOAD INTEGRATION LEAD	ORGN
	SIGNATURE	DATE

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NOTE THE FOLLOWING KEY:

A/{IX}-X-X
A = ADDENDUM
{IX} = SECTION INCREMENT NUMBER
X-X = SECTION/PAGE NUMBER

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SECTION 1, INTRODUCTION

This section contains the top-level requirements unique to the {Payload Name} for Increment {Increment number} **and Flight(s) {flight name(s), e.g. Utilization Flight (UF-1), etc.}**. This Addendum will contain all of the relevant data to document the ~~International Space Station~~ **ISS** Program ~~(ISSP)~~ and ~~Payload Developer (~~PD~~)~~ requirements and commitments for that increment. The Addendum is not a detailed collection of integration and operations requirements and data; such detailed information will reside in the payload data sets. All sections of {Payload-unique **EXPRESS Integration Agreement** (EIA) document number} are applicable during this increment except as modified by this Addendum.

A. The P~~ayload Developer~~ shall enter the appropriate information into each of the tables in the Addendum. If the requested information in the table is Not Applicable (N/A), N/A should be entered.

B. Section 1 of this Addendum describes the overall payload configuration and any changes that may occur during the increment. The PD shall document the purpose/objectives, a payload description, the payload category, the microgravity operating sensitivity, and the services required by the payload.

1.1 PAYLOAD PURPOSE/OBJECTIVES

This section documents the increment-specific purposes and objectives of the payload.

1.1.1 Payload Purpose/Objectives Statement

~~The PD shall provide the following information in Table 1.1.1-1, Payload Increment Purpose/Objectives.~~

~~Purpose/Objectives - A brief statement of the primary purpose and objectives of the payload. This description should be specific to this increment.~~

~~TABLE 1.1.1-1 PAYLOAD INCREMENT PURPOSE/OBJECTIVES~~

~~PURPOSE/OBJECTIVES~~

~~*[Expand table as required to document additional content.]*~~

{Purpose/Objectives - A brief statement of the primary purpose and objectives of the payload. This description should be specific to this increment.} # character, 1000 max. #

1.2 PAYLOAD DESCRIPTION

This section contains an increment-specific description of the payload, indicates what type of payload hardware will be flown, and the operation requirements for operating the payload during this increment. If the payload description or operation is expected to change during the course of the increment, the operational scenarios will be described. The PD shall provide in the subsequent tables: the increment-specific payload description, the science or technology category of the payload, and the microgravity sensitivity level of the payload during this increment.

1.2.1 Increment-Specific Payload Description

~~The PD shall provide the following information in Table 1.2.1-1, Increment-Specific Payload Description.~~

~~Brief Description - High-level description of the payload as it will operate during this increment. This should include the total number of experiment lockers/drawers which are to be integrated (not including any loose stowage items which are to be stowed for the PD by the International Space Station (ISS). Identify any other payloads which need to be co-manifested and available for use by this payload during this increment.~~

~~TABLE 1.2.1-1 INCREMENT-SPECIFIC PAYLOAD DESCRIPTION~~

~~BRIEF DESCRIPTION~~

~~*[Expand table as required to document additional content.]*~~

{Brief Description - High-level description of the payload as it will operate during this increment. Identify any other payloads which need to be co-manifested, co-located and/or operated concurrently for use by this payload during this increment.} # character, 500 max. #

1.2.2 Increment-Specific Payload Drawing

The PD shall provide ~~a~~ **required** drawing**s** ~~which~~ **to** depict~~s~~ the payload in its proposed on-orbit configuration in Figure 1.2.2-1, Increment-Specific Payload Drawing.

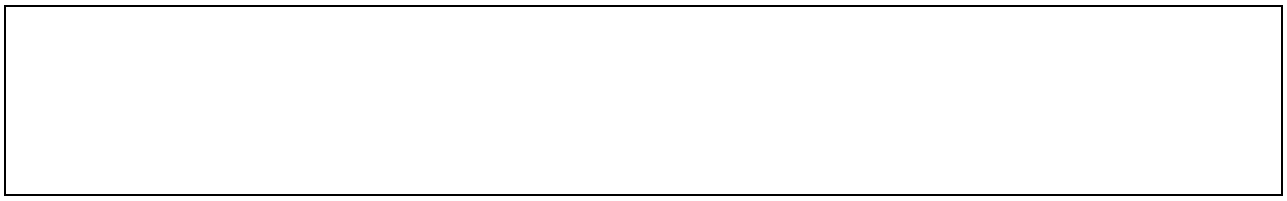

FIGURE 1.2.2-1 INCREMENT-SPECIFIC PAYLOAD DRAWING

1.2.3 Payload Category Type Selection

The PD shall provide the following information in Table 1.2.3-1, Payload Category Type Selection/Specification.

A. Payload Type - The payload science discipline or technology that best characterizes the payload. The PD shall indicate the category of the payload by placing an X in the appropriate cell in the right column. ~~If the payload type is "Other", a brief description will be provided by the PD.#~~ **selectable list, one or more as applicable #**

TABLE 1.2.3-1 PAYLOAD CATEGORY TYPE SELECTION/SPECIFICATION

PAYLOAD TYPE ~~(SELECT ONE ONLY)~~		CATEGORY
Biomedical Science		
Biotechnology		
Combustion Science		
Commercialization		
Earth Science		
Fluid Physics		
Gravitational Biology		
Materials Research		
Space Science		
Space Systems Technology		
Other (describe):		

[Note: If the payload type is "Other", a brief description will be provided by the PD. # character, 200 max #

1.2.4 International Space Station Operating Mode Sensitivity

The PD shall provide the following information in Table 1.2.4-1, ISS Operating Mode Sensitivity for Payload.

A. Microgravity Type - Select the microgravity type ~~by entering an X in the box to the right of the choice~~**from the listing**. Description of the ~~International Space Station (~~ISS~~)~~ microgravity types follow: **# select only one from list #**

(1) Sensitive - The contents of this payload carrier are sensitive to disturbances in the ISS microgravity environment.

~~(2)Sensitive/Disturber - The contents of this payload carrier may be sensitive to disturbances from the ISS and may also disturb the ISS microgravity environment during its various phases of operations.~~

~~(3)~~**(2)** Disturber - The contents of this payload carrier will create disturbances to the ISS microgravity environment.

~~(4)~~**(3)** Neither - This payload carrier is neither sensitive to disturbances in the **ISS** microgravity environment nor will they create disturbances in the **ISS** microgravity environment.

B. Level - Indicate the sensitivity and/or disturber level of the payload, if known, to the nearest order of magnitude in µg. ~~For sensitivity, also indicate the frequency range if known.~~ **# numeric, 99999.999 max. #**

TABLE 1.2.4-1 ISS OPERATING MODE SENSITIVITY FOR PAYLOAD

MICROGRAVITY TYPE (check one only)	~~FREQUENCY RANGE (IF KNOWN)~~	LEVEL (µg)
Sensitive		
~~Sensitive/Disturber~~		
Disturber		
Neither		

1.3 SERVICES

This section documents the Space Shuttle Program (SSP) ~~Standard Services, SSP Non-Standard Services and ISSP Non-Standard~~ services on a flight-by-flight basis, which are being requested by the PD. The SSP services are further described in NSTS 07700, Program

Definition and Requirements, Volume XIV, Space Shuttle System Payload Accommodations, **Appendix 5,** System Description Design Data ~~- Appendix 5~~, Ground Operations. ~~The SSP Non-Standard Services are further described in <**TBD A.1-1**>. In addition, the ISSP Non-Standard Services are described in <**TBD B-1**>.~~ **In addition, ~~ISSP~~ISS Program standard prelaunch and post landing services are described in the Support Requirements Data Set Blank Book, SSP 52000-PDS.**

The PD and the EXpedite the PRocessing of Experiments to Space Station (EXPRESS) Payload Integration Manager (EPIM) together will provide in the subsequent Table 1.3.1-1, SSP ~~and ISSP~~ non-standard services requirements, by flight: identification of hardware requiring the service, the service required, additional information, and a technical rationale for the service based on that specific hardware.

1.3.1 SSP ~~AND ISSP~~ Non-Standard Services Requirements

The PD and the EPIM shall provide the following information in Table 1.3.1-1 ~~Services Requirements.~~**SSP Non-Standard Services Requirements.**

A. Flight # - The requested flight identification (ID) number (e.g., ~~Utilization Flight~~ **7A.1,** UF-6, ~~7-PROG.~~). **# select one from list #**

~~B. Service Type - Indicate whether the service is a SSP Standard, SSP Non-Standard, or an ISSP Non Standard Service.~~

~~C~~**B. Location -- Identify the site (such as KSC or Dryden) ~~W~~where the requested service is located. # character, 100 max. #**

C. ~~Hardware~~Payload Item - Identify the hardware that requires the service. # character, 50 max. #

~~D. Need Date - The date the services are requested (e.g., Launch minus (L-) months to Return plus (R+) months).~~

D. Services - Choose from the following list of ~~ISSP and~~ SSP non-standard services and enter data in table. (Reference ~~P~~EIA Section 7 for a description of these services.) # selectable list, select one or more as required #

(1) Multi-Purpose Logistics Module (MPLM) late access for installation of conditioned cargo

(2) Middeck (MDK) late access for payload installation/servicing between Launch minus (L-) L-72 hours and L-24 hours

Category 1 - The payload requires late installation/servicing within L-3 days but prior to L-24 hours. The payload will be turned over from the PD to NASA KSC to allow installation in accordance with launch countdown and crew compartment stowage activities.

(3) Middeck late access for payload installation/servicing within L-24 hours

Category 2 - The payload requires late installation/servicing within L-24 hours. The payload will be turned over from the PD to NASA KSC to allow installation in accordance with a mission-unique stowage schedule.

(4) Middeck late access for payload installation/servicing within a specific time between L-24 hours and L-18.5 hours (enter specific time in column for additional data)

Category 3 - The payload requires late installation/servicing within a specific time between L-24 hours and L-18.5 hours (prior to the start of ascent switch list activities). The payload will be turned over from the PD to NASA KSC to allow installation in accordance with a mission-unique stowage schedule.

(5) Middeck late access for payload installation/servicing within a specific time between L-18.5 hours and L-15.5 hours

Category 4 - The payload requires late installation/servicing within a specific time between L-18.5 hours and L-15.5 hours (during times of conflict with the ascent switch list activities). This installation time must have additional approval and be integrated with other payloads by the KSC launch countdown working group.

(6) Prelaunch Orbiter power/cooling/data monitoring for a middeck payload

(7) Payload servicing for a 24 hour launch delay (middeck items only)

(8) Payload servicing for a 48 hour launch delay (middeck items only)

(9) Payload servicing for a greater than 48 hour launch delay but less or equal to a 30 day delay (middeck and MPLM) (enter specific time in column for additional data)

~~(10)Payload-unique rollback requirements in case of a contingency vehicle rollback (enter specific requirements in column for additional data)~~

~~(11)~~(10) Post-landing Orbiter power/cooling/data monitoring for a middeck payload

~~(12)~~(11) Nominal End of Mission (EOM) middeck early access for payload runway removal from the Orbiter crew compartment prior to Orbiter tow (less than Landing plus 6 hours)

~~(13)~~(12) Intact abort processing air transport to/from landing site

~~(14)~~(13) Early End of Mission (EEOM) middeck early access for payload runway removal from the Orbiter crew compartment prior to Orbiter tow (less than Landing plus 6 hours)

~~(15)~~(14) MPLM early access for removal of conditioned cargo

~~(16)~~(15) Other

E. Additional data - Enter any additional data necessary to describe the service required. # character, 200 max. #

~~E~~**F.** Technical Rationale - **Provide** a **specific** justification for the service such as the **specific** potential research/science loss. **This should consist of several sentences to quantify the science loss. Describe what would happen and how the science, safety or schedule would be affected if the service is not attained. Category 4 middeck installation requirements (late installation servicing within a specific time between L-18.5 hours and L-15.5 hours) must have a more detailed justification. # character, 200 max. #**

~~NOTE: Late loaded payload items requiring Middeck and Mini-Pressurized Logistics Module (MPLM) conditioned cargo scrub turnaround requirements (for example, 24 hours, 48 hours, 72 hours, 96 hours, and 120 hours) are to be negotiated, technically justified, and documented here. (Reference Addendum Section 3.4.)~~

~~TABLE 1.3.1-1 SERVICES REQUIREMENTS~~

~~FLIGHT #~~	~~SERVICE TYPE~~	~~LOCATION OF SERVICE~~	~~NEED DATE~~	~~TECHNICAL RATIONALE~~	~~BRIEF DESCRIPTION OF SERVICE~~

~~*[Expand table as required to document additional content.]*~~

TABLE 1.3.1-1 SSP NON-STANDARD SERVICES REQUIREMENTS

FLIGHT #	LOCATION	PAYLOAD ITEM	SERVICE	ADDITIONAL DATA	TECHNICAL RATIONALE

[Expand table as required to document additional content.]

SECTION 2, PAYLOAD PLANNING REQUIREMENTS

This section documents the operations concept **and requirements** of the payload during each increment. **This data will be used to develop the projected ~~prelaunch, ascent/decent, and~~ on-orbit requirements summarized in the Addendum Sections ~~3, 4, and 5~~.** The data collected in this section reflects the resources per Payload Operations Performance (POP) to implement the operations concept of the ~~facility~~ **integrated rack**. The data also addresses special considerations that should be taken into account during payload tactical planning and manifesting.

The PD will define in the subsequent sections the payload operation performance description, the basic on-orbit operating requirements, the on-orbit resource requirements, the on-orbit consumable **requirements**, and the **ascent/descent** stowage requirements **associated with the increment**.

2.1 PAYLOAD OPERATION PERFORMANCE REQUIREMENTS

This section documents the top-level resource operations requirements for the payload. The top-level operations requirements for the payload are requested for each nominal POP type which is defined as follows:

~~Payload operations performance~~ **POP** type - A category of payload operations; a PD-defined sequence of payload activities expected to result in the completion of a major objective of the payload, such as the growth of a crystal or a major maintenance/calibration operation.

2.1.1 Payload Operation Performance Description

The PD shall provide the following information in Table 2.1.1-1, Payload Operation Performance Description.

A. ~~Payload Operation Performance Identifier (~~POP ID~~) is~~ - a short title or identifier for each type of payload operation. **# character, 50 max. #**

B. Payload Operation Performance Description - Description of the payload operation performance. Describe the operation performance including critical performance requirements such as event dependence, continuous operation, or operation when resources are available. **# character, 200 max. #**

TABLE 2.1.1-1 PAYLOAD OPERATION PERFORMANCE DESCRIPTION

POP ID	DESCRIPTION

[Expand table as required to document additional content.]

2.1.2 ***Payload*** *On-Orbit Operating Requirements*

The PD shall provide the following basic on-orbit operating requirements **for each POP ID** in Table 2.1.2-1, Basic On-Orbit Operating Requirements.

A. POP ID - A short title or identifier for each type of payload operation. **# select one from pre-defined list #**

B. Minimum Acceptable Number of Performances - The minimum number of payload operation performances required during the Increment. **# numeric, 99999.999 max. #**

C. Maximum Time Allowed to Complete Performances - The maximum number of months the ~~ISSP~~**ISS Program** is allowed to complete the specified minimum acceptable number of performances. **# numeric, 99999.999 max. #**

D. Nominal Payload Operation Performance Time - The average duration of one nominal payload operation performance of the payload, in hours. **# numeric, 99999.999 max. #**

E. Minimum Time Required Between Performances - The minimum amount of time required between payload operating performances, in hours. **# numeric, 99999.999 max. #**

TABLE 2.1.2-1 BASIC ON-ORBIT OPERATING REQUIREMENTS

POP ID	BASIC ON-ORBIT OPERATING REQUIREMENTS	AMOUNT
	Minimum Acceptable Number of Performances:	
	Maximum Time Allowed to Complete Performances (months):	
	Nominal Payload Operation Performance Time (hours/performance):	
	Minimum Time Required Between Performances (hours):	

[Expand table as required to document additional content for each POP ID defined.]

2.2 ON-ORBIT RESOURCE REQUIREMENTS

This section documents the peak (not transient) and off-peak resources required by the payload per POP ID. These requirements include electrical power, **vacuum exhaust system, environmental control and life support systems, thermal,** data uplink and downlink, video uplink and downlink, ~~payload~~ **payload-**~~to~~ **to-**payload communications, ~~and~~ crew support/subject**, and consumable resources**.

Electrical power is power required to support payload operations, in ~~Watts (W)~~ **kilowatts (kw)**.

Auxiliary power is the average amount of essential/auxiliary electrical power required by the payload in the event of loss of main power, in ~~watts~~kw.

Vacuum exhaust is the average amount of time required on the EXPRESS Vacuum Exhaust System (VES) during one nominal payload operation performance of the payload, in hours.

The thermal flow is the average amount of moderate and low temperature cooling required by the payload, **in kilograms/**hour.

Data uplink is the transmission rate of digital data from the ground to the ISS, in kilobits-per-second (kbps).

Data downlink is the transmission rate of digital data from the ISS to the ground, in ~~Megabytes~~ **Megabits**-per-second (Mbps).

Video uplink ~~or down link is the duration of payload video transmission required in hours~~ **is the transmission rate of digital video from the ground to the ISS, in Mbps. Analog video signals generated by a payload are connected to a digital stream for downlink by the Video Baseband Signal Processor (VBSP). A correlation between analog video and the appropriate digital rate must be made.**

Video downlink is the transmission rate of digital video from the ISS to the ground. Video downlink information is requested in Mbps or bit size and frame field/seconds (preferred).

The payload to payload Local Area Network (LAN) can provide users with the capability to transfer data from an International Standard Payload Rack (ISPR) to one or more ISPR locations, in Megabits.

Crew support is the number of ISS crew members required to simultaneously support payload operations. Crew subject is the number of ISS crew members required as life

science subjects. It should be noted that the peak and off-peak requirements of the various resources do not necessarily coincide.

Data packet size refers to the length of the Consultative Committee for Space Data Systems (CCSDS) data packet. Data packet rate refers to the number of data packets to be downlinked to the ground. Data packet grouping refers to any special orbital periods when the data packets need or are expected to be transmitted to the ground.

*2.2.1 **Payload** On-Orbit Resource Requirements*

The PD shall provide the following on-orbit resource requirements **for each POP ID** in Table 2.2.1-1, On-Orbit **POP** Resource Requirements.

The following definitions explain the column headings in Table 2.2.1-1.

A. POP ID - A short title or identifier for each type of payload operation. **# select one from pre-defined list #**

~~B. Peak Amount Requirements - The peak amount of the resource required in the specified units.~~

B. Peak Quantity - The peak amount of the resource required in the units specified.

~~C. Peak Duration Requirements - The average duration for the associated peak amount requirements, in minutes, per payload operation performance.~~

C. Peak Duration - The duration for the associated peak quantity in the units specified.

~~D. Off-Peak Amount Requirements - The average off-peak amount of the resource required in the specified units.~~

D. Off-Peak Quantity - The average off-peak amount of the resource required in the units specified.

~~E. Off-Peak Duration Requirements - The average duration for the associated off-peak amount requirements, in hours, per payload operation performance.~~

E. Off-Peak Duration - The duration for the associated off-peak quantity in the units specified.

F. Resource – Listings of items that require data input from the PD.

The PD shall provide the following on-orbit resource requirements:

***~~F~~A. ~~UIP~~ Power - The power drawn at the utility interface panel.**

***~~G~~B. Auxiliary - The power drawn from the auxiliary power interface to maintain minimum experiment operation.**

~~H. UOP Power - The power drawn from the utility outlet panel.~~

~~I~~C. Vacuum Exhaust Rate - The rate and duration of vacuum vent.

~~J. Vacuum Exhaust Frequency - The frequency of vacuum vent for the POP.~~

~~K~~D. Vacuum Resource ~~Frequency~~Duration - The duration ~~and frequency~~ of vacuum use as a resource in the rack.

~~L~~E. Moderate ~~Temp.~~Temperature Loop Flowrate - The flowrate of fluid through the moderate temperature loop in the rack and the duration of that flowrate.

~~M~~F. Moderate Temperature ~~Temp.~~ Loop Heat Dissipation - The amount of heat dissipated into the MTL per unit of time.

~~N~~G. Low Temperature Loop Flowrate - The flowrate of fluid through the low temperature loop in the rack and the duration of that flowrate.

~~O~~H. Low Temperature ~~Temp.~~ Loop Heat Dissipation - The amount of heat dissipated into the LTL per unit of time.

~~P~~I. Latent Cabin Air Heat Dissipation - Heat with moisture (humidity) dissipated into the cabin (e.g., life sciences payloads).

~~Q~~J. Sensible Cabin Air Heat Dissipation - Heat without moisture dissipated into the cabin.

~~R. Moderate Temp. Loop Flow Control - The method of control for the flow of fluid through the moderate temperature loop in the rack. Indicate whether the method of control is automatic or manual. Manual is defined as internal rack control.~~

~~S. Moderate Temp. Loop Flow Controlling Parameter - The parameter used to control the flow of fluid through the Moderate Temperature Loop in the rack. Indicate whether this parameter is the flowrate, exit temperature, or some other parameter.~~

~~T~~K. Data Uplink - The rate and duration of data uplinked to ISS and routed to the rack via the 1553B Payload Bus.

~~U~~L. Low Rate Data Downlink - The rate and duration of data transmitted from the rack to the ground via the ISS 1553B payload bus. The requirements should split into sub-categories: Payload Health and Status and low rate telemetry.

~~V~~M. Medium~~.~~ Rate Data Downlink - The rate and duration of data transmitted from the rack to the ground via the ISS Payload Ethernet Bus.

(16) Words per packet

(17) Packets per second and its duration

(18) Duration between sessions

~~W~~N. High Rate Data Downlink/Digitized Video Rate/Duration - The rate and duration of data transmitted from the rack to the ground via the ISS high rate data link.

~~X. Video Uplink - The rate and duration of video uplinked to ISS and routed to the rack via the ISS video system.~~

~~Y. Video Downlink - The rate and duration of video transmitted from the rack to the ground via the ISS video system.~~

~~Z~~O. Video Downlink Bit & Frame Field Data – the bit and frame field size of data transmitted via the analog camera through the ISS Video Baseband Signal Processor.

~~AA. Video Transfer to another Rack - The rate and duration of video transmitted to another ISS rack.~~

~~BB~~P. Low Rate Data Transfer to another Rack - The rate and duration of data transmitted to another rack via the ISS 1553B payload bus.

~~CC~~Q. Medium~~.~~ Rate Data Transfer to another Rack - The rate and duration of data transmitted to another rack via the ISS payload ethernet bus.

(1) Words per packet

(2) Packets per second and its duration

(3) Duration between sessions

~~DD~~R. High Rate Data Transfer to another Rack - The rate and duration of data transmitted to another rack via the ISS high rate data link.

~~EE~~S. Crew Support - The number of crew persons and duration required for the POP.

***Off-Peak Power Quantity is defined as the nominal continuous power drawn by a given payload configuration as defined by the POP ID. If there is a minor variation in power consumption within the given POP ID, the normalization (or average) of the power drawn is acceptable.**

Peak power quantity is defined as the maximum power drawn, above the nominal draw, which occurs for greater than ten milliseconds during the POP ID.

~~TABLE 2.2.1-1 ON-ORBIT RESOURCE REQUIREMENTS~~

~~POP ID~~	~~RESOURCE~~	~~UNITS~~	~~PEAK REQUIREMENTS~~		~~OFF-PEAK REQUIREMENTS~~	
			~~QUANTITY (SEE UNITS)~~	~~DURATION (MINUTES)~~	~~QUANTITY (SEE UNITS)~~	~~DURATION (HOURS)~~
	~~Electrical Power~~	~~W~~				
	~~Vacuum Exhaust~~	~~N/A~~				
	~~Moderate Thermal Loop~~	~~hrs~~				
	~~Data Uplink~~	~~Kbps~~				
	~~Data Downlink~~	~~Mbps~~				
	~~Video Uplink~~	~~N/A (NTSC)~~				
	~~Video Downlink~~	~~N/A (NTSC)~~				
	~~Crew Support~~	~~persons~~				
	~~Crew Subject~~	~~persons~~				

~~[Expand table as required to document additional content for each POP ID.]~~

TABLE 2.2.1-1 ON-ORBIT POP RESOURCE REQUIREMENTS (Sheet 1 of 2)

POP ID:_____	PEAK		OFF-PEAK	
RESOURCE	QUANTITY	DURATION	QUANTITY	DURATION
~~UIP~~ Power (~~kw~~W and hours)				
Auxiliary (~~kw~~W and hours)				
~~UOP Power (kw and hours)~~				
Vacuum Exhaust Rate (kg/minute and min)				
~~Vacuum Exhaust Frequency (# of times per POP)~~				
Vacuum Resource ~~Frequency~~Duration (min) ~~(# of times per POP and min)~~				
Moderate Temperature~~.~~ Loop Flowrate (kg/hr and hours)				
Moderate Temperature~~.~~ Loop Heat Rejection (Watts and hours)				
Low Temperature Loop Flowrate (kg/hr and hours)				
Low Temperature Loop Heat Rejection (Watts and hours)				
Latent Cabin Air Heat Dissipation (Watts and hours)				
Sensible Cabin Air Heat Dissipation (Watts and hours)				
~~Moderate Temp Loop Flow Control (indicate whether automatic or manual)~~				
~~Moderate Temp Loop Flow Controlling Parameter (indicate whether flow rate, exit temp., or other)~~				
Data Uplink (kbps and seconds)				
Low Rate Data Downlink Rate/Duration (kbps and seconds) A. Payload Health and Status B. Low Rate Telemetry				
~~Med.~~Medium Rate Data Downlink Rate/Duration ~~(Mbps and seconds)~~ A. Words per packet B. Packet per second C. Duration between sessions (sec)				

TABLE 2.2.1-1 ON-ORBIT POP RESOURCE REQUIREMENTS (Sheet 2 of 2)

POP ID:_____	PEAK		OFF-PEAK	
	QUANTITY	DURATION	QUANTITY	DURATION
High Rate Data Downlink Rate/Duration (Mbps and seconds)				
~~**Video Uplink/Duration (Mbps and seconds)**~~				
~~**Video Downlink/Duration (Mbps and seconds)**~~				
Video Downlink Bit & Frame Field Data and seconds **Select from the following:** **6 bit, 30 full frame fields/sec;/Secs.** **6 bit, 30 half-frame fields/sec;/Secs.** **6 bit, 15 half-frame fields/sec;/Secs.** **6 bit, 7.5 half-frame fields/sec;/Secs.** **6 bit, 1.875 half frame fields/sec; Secs.** **8 bit, 30 full frame fields/sec;/Secs.** **8 bit, 30 half-frame fields/sec;/Secs.** **8 bit, 15 half-frame fields/sec;/Secs.** **8 bit, 7.5 half-frame fields/sec;/Secs.** **8 bit 1.875 half frame fields/sec./Secs.**				
~~**Video Transfer to another Rack (Mbps and seconds)**~~				
Low Rate Data Transfer to another Rack (kbps and seconds)				
Medium~~.~~ Rate Data Transfer to another Rack ~~(Mbps and seconds)~~ **A. Words per packet** **B. Packet per second** **C. Duration between sessions (sec)**				
High Rate Data Transfer to another Rack (Mbps and seconds)				
Crew Support (# persons and minutes)				

[Expand table as required to document additional content for each POP ID.]

 # All entries numeric, 99999.999 max., except as noted in par 2.2.1. #

2.3 ON-ORBIT CONSUMABLE REQUIREMENTS

This section provides information about the ISS consumable resources required per POP ID. Note that potable water must be transported to the payload by a crewmember.

The PD shall provide the following on-orbit consumable requirements for each POP ID in Table 2.3-1, Increment On-Orbit ~~Resource~~Consumable Requirements.

A. POP ID - A short title or identifier for each type of payload operation. **# select one from pre-defined list #**

~~B Amount - Specify the amount of the selected ISS consumable required for each POP ID.~~

B. Peak Quantity - The peak amount of the resource required in the units specified.

C. Peak Duration - The duration for the associated peak quantity in the units specified.

D. Off-Peak Quantity - The average off-peak amount of the resource required in the units specified.

E. Off-Peak Duration - The duration for the associated off-peak quantity in the units specified.

F. Gaseous Nitrogen Consumption - The aggregate amount of gaseous nitrogen ~~consumed~~used for the POP.

G. Argon Consumption - The aggregate amount of argon ~~consumed~~used for the POP.

H. Helium Consumption - The aggregate amount of helium ~~consumed~~used for the POP.

I. Carbon Dioxide Consumption - The aggregate amount of carbon dioxide ~~consumed~~used for the POP.

J. Potable Water Consumption - The aggregate amount of potable water ~~consumed~~used for the POP.

~~**K. Support Equipment - List Laboratory Support Equipment (LSE) or Station Support Equipment (SSE) to be used and the duration of use (minutes/hours/days). One item per line.**~~

K. Oxygen Consumption – The aggregate amount of oxygen consumed from the atmosphere for the POP (e.g., life sciences payload)

L. Air Consumption – The aggregate amount of cabin air that is vented overboard due to payload operations for the POP.

M. Carbon Dioxide Addition – The aggregate amount of cabin air that is vented overboard due to payload operations for the POP.

N. Orbiter Transferred Water Consumption – The aggregate amount of Orbiter transferred water that is used for the POP. The input shall also specify if the biocide in the Orbiter transferred water will be iodine (1-4 ppm iodine) or silver (0.3 - 0.5 ppm silver) or no biocide at all.

O. Partial Pressure of Carbon Dioxide Level – The requested unique average and peak partial pressure of carbon dioxide levels in the cabin aisle way for the POP. The nominal ISS partial pressure of carbon dioxide levels in the cabin aisle way is a daily average of 5.3 mmHg with a peak of ≤ 7.6 mmHg.

P. Condensate Absorption – The aggregate amount of water vapor removed from the atmosphere for the POP.

~~TABLE 2.3.1-1 ON-ORBIT CONSUMABLE REQUIREMENTS~~

~~POP ID~~	~~ISS-PROVIDED CONSUMABLE~~	~~AMOUNT (kg)~~
	~~Gaseous Nitrogen (GN_2)~~	
	~~Argon (Ar)~~	
	~~Helium (He)~~	
	~~Carbon Dioxide (CO_2)~~	
	~~Potable Water~~	

~~[Expand table as required to document additional content for each POP ID.]~~

TABLE 2.3.~~1~~-1 INCREMENT ON-ORBIT CONSUMABLE REQUIREMENTS

~~POP ID:_____~~	~~PEAK~~		~~OFF-PEAK~~	
	~~QUANTITY~~	~~DURATION~~	~~QUANTITY~~	~~DURATION~~
~~Gaseous Nitrogen Consumption (kg)~~				
~~Argon Consumption (kg)~~				
~~Helium Consumption (kg)~~				
~~Carbon Dioxide Consumption (kg)~~				
~~Potable Water Consumption (kg)~~				
~~Support Equipment and Duration of Use (minutes/hours/days)~~				

POP ID_____	**PEAK**		**OFF-PEAK**	
	QUANTITY	**DURATION**	**QUANTITY**	**DURATION**
Gaseous Nitrogen Consumption (kg)				
Argon Consumption (kg)				
Helium Consumption (kg)				
Carbon Dioxide Consumption (kg)				
Potable Water Consumption (kg)				
Oxygen Consumption (kg)				
Air Consumption (kg)				
Carbon Dioxide Addition (kg)				
Orbiter Trfd Water Consumption (kg)				
Partial Pressure of Carbon Dioxide (mmHg)				
Condensate Absorption (kg)				

[Expand table as required to document additional content for each POP ID.] # All entries numeric, 99999.999 max., except as noted in par 2.3 #

2.4 RESUPPLY STOWAGE REQUIREMENTS

This section documents the ~~on-orbit stowage requirements going to and from the ISS~~**increment totals for ascent/descent (up mass resupply or down mass resupply or down mass production)** per POP ID~~. The stowage requirements in this table are~~ for those ~~loose~~ items which will be accommodated outside the payload ~~lockers/drawers~~ racks**.** ~~or lockers that contain the main payload hardware.~~ The PD will ~~define in the subsequent table, by POP ID:~~**provide** the ~~payload carrier~~**stowage container, the stowage constraint/orientation**, the up mass and volume, and the down mass and volume.

2.4.1 Resupply Stowage Requirements

The PD shall provide the following requirements for each POP ID in Table 2.4.1-1, Re-supply~~/~~ Stowage Requirements.

A. POP ID - A short title or identifier for each type of payload operation. **# select one from pre-defined list #**

~~B. Hardware Item - The rack, locker, drawer, etc., which is used as a carrier for transporting the payload to the ISS while on the ISS and during return. If the Hardware Item is not known, this cell should be left blank pending analysis to determine the appropriate Hardware Item.~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # character, 50 max. #

~~B~~**C.** Stowage Container - The container where the requested **payload** item will be stored while on-orbit. ~~If the items do not require a unique container such as a freezer etc., and can be placed into standard stowage lockers/drawers, then just state "passive stowage" for the container. The ISS will then perform an analysis to determine the appropriate payload container.~~ **If the ~~payload carrier~~stowage container is not known, this cell should be left blank pending analysis to determine the appropriate payload container.** Below is a list of the stowage containers and locations. **# select one from list #**

+4 °C Refrigerator	-20 °C Freezer	-80 °C Freezer	-183 °C Cryo Freezer
ASC	Soft Stowage	MDL	Stowage Drawers
Incubator	Hazardous Trash Containers	Nonhazardous Trash Containers	Other/No Requirements

D Stowage Constraints/Orientation - Indicate stowage items that have constraints or specific orientation requirements when stowed. # character, 200 max. #

~~C~~**E**. Mass - Specify the **total** up/down mass of the stowage for each container required **for each POP ID # numeric, 99999.999 max. #**~~.~~

~~NOTE: Do not include the mass of any packing materials unless they are payload-provided.~~

~~D~~**F**. Volume - Specify the **total** up/down volume of the stowage for each container required for each POP ID. **# numeric, 99999.9999 max. #**

~~NOTE: Do not include the volume requirements of any packing materials unless they are payload-provided.~~

~~TABLE 2.4.1-1 RESUPPLY/STOWAGE REQUIREMENTS~~

~~POP ID~~	~~STOWAGE CONTAINER~~	~~UP MASS RESUPPLY~~		~~DOWN MASS PRODUCT~~	
		~~MASS (KG)~~	~~VOLUME (m^3)~~	~~MASS (KG)~~	~~VOLUME (M^3)~~

~~[Expand table as required to document additional content for each POP ID]~~

TABLE 2.4.1-1 RESUPPLY STOWAGE REQUIREMENTS

POP ID	PAYLOAD ITEM	STOWAGE CONTAINER	CONSTRAINT/ ORIENTATION	UP MASS RESUPPLY		DOWN MASS PRODUCTION	
				MASS (kg)	VOLUME (m^3)	MASS (kg)	VOLUME (m^3)

[Expand table as required to document additional content for each POP ID.]

{NOTE: Do not include the volume or mass of any padding materials unless this value is provided by the Payloads Office.}

SECTION 3, PRELAUNCH TO ~~ASCENT~~ EARLY ON-ORBIT REQUIREMENTS

This section documents the **prelaunch to early on-orbit** requirements for the transportation of the payload to the ISS. ~~This section reflects a summary of the launch requirements in Addendum Section 2.0, Payload Planning Requirements.~~

The PD will identify in the subsequent tables per flight: the payload hardware, payload Launch Commit Criteria (LCC), maximum launch configuration, and the ascent to on-orbit requirements. Details of these requirements will be further documented in the various payload-specific data sets.

3.1 PAYLOAD HARDWARE INFORMATION

This section documents the payload hardware **prelaunch processing and** transportation scenario to the ISS. It also contains a ~~brief~~ description of the payload hardware **with configuration data**.

3.1.1 Prelaunch Processing and Payload Transportation to ISS Activities

The PD shall provide the following information in Table 3.1.1-1, Scenario of Prelaunch Processing and Payload Transportation to ISS Activities.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

B. Prelaunch to On-Orbit Activities - Define ~~the~~ **by flight the** scenario describing ~~the~~ prelaunch processing ~~and the transportation of the payload hardware to the ISS by flight. It will include a summary or brief description of the prelaunch to on-orbit activities (including reactivation of time sensitive hardware).~~**from hardware turnover through launch. Define by flight, the scenario describing transportation of the payload hardware to the ISS which includes any reactivation of time sensitive hardware. # character, 1800 max. #**

TABLE 3.1.1-1 SCENARIO OF PRELAUNCH PROCESSING AND PAYLOAD TRANSPORTATION TO ISS ACTIVITIES

FLIGHT #	PRELAUNCH TO ON-ORBIT ACTIVITIES

[Expand table as required to document additional content.]

3.1.2 Payload Hardware Description

The PD shall provide the following information in Table 3.1.2-1, Payload Hardware Description.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select from list in PDL #**

~~B. Payload Item - The payload-provided hardware item(s) to be transported to the ISS (e.g., samples, tools, payload-provided experiment units, etc.).~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # character, 50 max. #

~~C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload to the ISS. The locker may be an ISSP-provided Middeck Locker (MDL) or a payload-provided Middeck Locker Equivalent (MDLE). For lockers, specify powered (P) or unpowered (UP) by the locker designation (example: MDL (UP), MDLE (P) etc.). If the payload carrier is not known, this cell should be left blank pending analysis to determine the appropriate payload carrier.~~

C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload to the ISS. If the payload item has no carrier requirements identify as N/A until the ISS Program determines the appropriate carrier. # select one from list #

ISPR
Powered Single MDL
Unpowered Double MDLE
12-Panel Unit ISIS Drawer
ASC/Softpack
-183 °C Cryo Freezer
No Preference
EXPRESS Rack
Powered Double MDLE
4-Panel Unit ISIS Drawer
Stowage Tray
-20 °C Freezer
Undefined/Loose Items
Transportation Rack
Unpowered Single MDL
8-Panel Unit ISIS Drawer
+4 °C Refrigerator
-80 °C Freezer
Other

~~C~~D. Payload ~~Item~~Carrier Location - The location of the payload carrier (e.g., MDK, MPLM, ~~ISPR, etc.~~ no preference). # select one from PDL list #

~~ISPR~~	~~EXPRESS Rack~~	~~Transportation Rack~~	
~~Powered Single MDL~~	~~Powered Double MDL~~**~~E~~**	~~Unpowered Single MDL~~	~~Unpowered Double MDL~~**~~E~~**
~~4-Panel Unit ISIS Drawer~~	~~8-Panel Unit ISIS Drawer~~	~~12-Panel Unit ISIS Drawer~~	~~Stowage Tray~~
~~+4 °C Refrigerator~~	~~-20 °C Freezer~~	~~-80 °C Freezer~~	~~-183 °C Cryo Freezer~~
~~ASC/Softpack~~	~~Undefined/Loose Items~~	~~Other~~	~~**No Preference**~~

~~D. Payload Carrier Location - The required location of the payload carrier (e.g., Middeck (MDK), Mini-Pressurized Logistics Module (MPLM), N/A (no requirement), etc.).~~

~~D~~**E**. Volume - The volume of the payload carrier inclusive of the payload hardware. If the ~~hardware~~ **payload** item is an ISPR, transportation rack, Middeck Locker (MDL), or an International Subrack Interface Standard (ISIS) drawer, this cell is to be left blank. **# numeric, 99999.999 #**

~~E. Volume - The volume of the payload items. If the payload is a single or double MDL or MDLE, or an International Subrack Interface Standard (ISIS) drawer, this cell may be left blank.~~

~~E~~F. Mass - The mass of the payload item ~~inclusive of the payload hardware~~ listed in the table. # numeric, 99999.999 #

~~F. Mass - The mass of the payload items listed, including the mass of any payload-provided carriers or payload-dedicated ISSP carriers (e.g., ISSP MDL's ISIS drawers, etc., listed as payload dedicated in Table 3.2.2-1, Program Furnished Equipment Flight Requirements).~~

~~F~~G. Additional Information - Information such as unique shapes and sizes, hazardous materials, etc., which might be pertinent to the ~~ISSP~~ISS Program. # character, 50 max. per item #

~~G. Additional Information - Information such as unique shapes and sizes, hazardous materials, etc., which might be pertinent to the ISSP.~~

~~G~~H. Total Mass/Flight - The total mass of the payload item(s) inclusive of the payload hardware, by flight. # numeric, 99999.999 max. #

~~H. Total Mass/Flight - The total mass of the payload items and payload-provided or dedicated carriers(s), by flight.~~

~~TABLE 3.1.2-1 PAYLOAD HARDWARE DESCRIPTION~~

~~FLIGHT #~~	~~PAYLOAD ITEM~~	~~PAYLOAD CARRIER~~	~~PAYLOAD CARRIER LOCATION (MDK, MPLM, N/A, ETC.)~~	~~VOLUME (M^3)~~	~~MASS (KG)~~
			~~Total Mass/Flight:~~		

			~~Total Mass/Flight:~~		

~~*[Add notes as required to document additional information.]*~~
~~*[Expand table as required to document additional content.]*~~

TABLE 3.1.2-1 PAYLOAD HARDWARE DESCRIPTION

FLIGHT #	**PAYLOAD ITEM**	**PAYLOAD CARRIER**	**PAYLOAD CARRIER LOCATION (MDK, MPLM, ETC.)**	**VOLUME (m^3)**	**MASS (kg)**	**ADDITIONAL INFORMATION**
			Total Mass/Flight:			

[Expand table as required to document additional content.]

3.2 PROGRAM-FURNISHED EQUIPMENT

This section of the EIA Addendum documents the flight-by-flight PD**'s** requirements for Program-Furnished Equipment (PFE) ~~for payload~~**to support** ground and flight ~~hardware for each~~ ~~**flight**~~**activities within Increment {Increment #}. The ~~ISS~~ISS Program will review, provide, approve, and fabricate all decals.**

3.2.1 Ground Requirements

The PD shall provide the following information in Table 3.2.1-1, Program-Furnished Equipment Ground Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). # select one from list #

B. Equipment - ~~The PFE ground hardware to be used by the PD. Examples are: 1. Suitcase Simulator 2. Ground support batteries for powered late loading of experiment hardware.~~ **The program-furnished equipment ground hardware required by the PD (e.g., Active Rack Isolation System (ARIS), avionics air assembly, connectors, quick disconnects etc.). Hardware to be listed in this table includes ISS fleet resources and other ISS-provided hardware but does not include KSC-provided hardware and equipment to be used by the PD at KSC. KSC-provided hardware and equipment to be used at KSC shall be entered in the KSC support requirements data set. # character, 1000 max. #**

C. Quantity - Number of parts for each line item piece of equipment needed. # numeric, 99999.999 #

~~C~~D. Need Date - The date by which the equipment is needed (e.g., L-24 months - ~~L-12 months,~~ **or mm/dd/yy). # character, 30 max. #**

~~D~~**E**. Duration - The length of time from launch, the equipment is needed (e.g., L-24 months to L-12 months**, or mm/dd/yy to mm/dd/yy**). **# character, 30 max. #**

F. Equipment Specific Notes - At a minimum, the notes should contain, Ship To: (address) and Mark For: (person to receive equipment) information. Other information could be payload specific rationale for clarification purposes. # character, 200 max. #

~~TABLE 3.2.1-1 PROGRAM-FURNISHED EQUIPMENT GROUND REQUIREMENTS~~

~~FLIGHT #~~	~~LOCATION~~	~~EQUIPMENT~~	~~NEED DATE~~	~~DURATION~~

~~*[Expand table as required to document additional content.]*~~

TABLE 3.2.1-1 PROGRAM-FURNISHED EQUIPMENT GROUND REQUIREMENTS

FLIGHT # ~~(A)~~	EQUIPMENT ~~(B)~~	QUANTITY ~~(C)~~	NEED DATE ~~(D)~~	DURATION ~~(E)~~	EQUIPMENT SPECIFIC NOTES ~~(F)~~

[Expand table as required to document additional content.]

NOTE: One item type per line.

3.2.2 Flight Requirements

The PD shall provide the following information in Table 3.2.2-1, Program Furnished Equipment **(PFE)** Flight Requirements. **This includes any PFE required to support the flight integration and support operations required to be performed on the Shuttle.**

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Equipment Item and Quantity - The PFE flight hardware item and quantity to be used by the PD. Examples are:~~

~~1. Lockers.~~

~~2. Drawers.~~

~~3. STS payload mounting panels.~~

~~4. STS double adapter plates.~~

~~5. EXPRESS Rack power cables.~~

~~6. EXPRESS Rack power connectors (12 Gauge).~~

~~7. EXPRESS Rack data connectors.~~

~~8. EXPRESS Rack coolant loop quick disconnects.~~

~~9. STS-provided power cables (Middeck).~~

B. Equipment - The ~~program-furnished equipment~~PFE flight hardware to be used by the PD (e.g., Active Rack Isolation System (ARIS), avionics air assembly, connectors, etc.). # character, 100 max. #

C. Quantity - Number of parts for each line item piece of equipment needed. # numeric, 99999.999 max. #

~~C~~**D**. Need Date - The date by which the equipment is needed (e.g., L-24 months ~~to L-12 months~~**, or mm/dd/yy**). **# character, 30 max. #**

~~D~~**E**. Duration - The length of time from launch that the equipment is needed (e.g., L-24 months to L-12 months, **or mm/dd/yy to mm/dd/yy**). **# character, 30 max. #**

F. Equipment Specific Notes - At a minimum, the notes should contain, Ship To: (address) and Mark For: (person to receive equipment) information. Other information could be payload specific rationale for clarification purposes. # character, 200 max. #

~~TABLE 3.2.2-1 PROGRAM-FURNISHED EQUIPMENT FLIGHT REQUIREMENTS~~

~~FLIGHT #~~	~~LOCATION~~	~~EQUIPMENT~~	~~NEED DATE~~	~~DURATION~~

~~NOTE: One item per line.~~

~~[Expand table as required to document additional content.]~~

TABLE 3.2.2-1 PROGRAM-FURNISHED EQUIPMENT FLIGHT REQUIREMENTS

FLIGHT # (A)	EQUIPMENT (B)	QUANTITY (C)	NEED DATE (D)	DURATION (E)	EQUIPMENT SPECIFIC NOTES (F)

[Expand table as required to document additional content.]

NOTE: One item type per line.

3.3 PAYLOAD LAUNCH COMMIT CRITERIA

This section contains the payload LCC. Criteria for developing payload constraints for Shuttle launches are identified in NSTS 07700, Volume XIV, Appendix 5, Section 6.

3.3.1 Launch Commit Criteria Requirements

The PD shall provide the following LCC information in Table 3.3.1-1, Payload Launch Commit Criteria.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item/Carrier - The payload-provided hardware items and/or payload-provided carriers for which the LCC is requested.~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # character, 50 max. #

C. Payload LCC - The requirements, negotiated by the ~~ISSP~~**ISS Program**, the launch vehicle office, and the PD which could cause launch holds. **# character, 200 max. #**

D. Technical Rationale - A justification for the need of the LCC. **Provide a specific justification for the LCC such as the specific potential research/science loss. This should consist of several sentences to quantify the science loss. Describe what would happen and how the science, safety, or schedule would be affected if your LCC is not approved. # character, 200 max. #**

TABLE 3.3.1-1 PAYLOAD LAUNCH COMMIT CRITERIA

FLIGHT #	PAYLOAD ITEM	PAYLOAD LCC	TECHNICAL RATIONALE

[Expand table as required to document additional content.]

3.4 PAYLOAD MAXIMUM LAUNCH CONFIGURATION

~~The maximum launch configuration duration is the amount of time the payload can sustain its launch configuration without physical access. Conditioned cargo launch configuration duration is based on the completion of MPLM access at L-84 **L-88** hours. All other MPLM payloads besides conditioned cargo have a launch configuration duration based~~

~~on completion of MPLM payload closeouts in the Space Station Processing Facility (SSPF) at approximately L-2.5 months.~~

~~In Table 3.4.1-1, Payload Maximum Launch Configuration Duration, provide both the technical rationale and the requirement for the maximum amount of days (or indicate indefinitely) from the completion of payload prelaunch operations until the payload requires access after an extended launch delay.~~

~~NOTE: Middeck payload and conditioned cargo scrub turnaround requirements less than or equal to 30 days (for example, 2 hours, 48 hours, 72 hours, 96 hours, and 120 hours) are to be negotiated, technically justified, and documented in Addendum Section 1.3, Services.~~

The maximum launch configuration duration is the amount of time the payload rack/payload items can sustain its launch configuration from turnover/last servicing without physical access. The payload rack has a launch configuration from duration based on turnover/last servicing just prior to or during PTCS integration and test at approximately L-5 months. Subrack payload items requiring MPLM time-critical installation have a launch configuration duration based on turnover/last servicing just prior to completion of MPLM payload closeouts in the Space Station Processing Facility (SSPF) at approximately L-2.5 months. Subrack payload items requiring MPLM late access such as conditioned cargo have a launch configuration duration based on turnover/last servicing just prior to the completion of MPLM access at L-88 hours. Payload items requiring middeck access have a launch configuration duration based on turnover/last servicing beginning at approximately L-8 days for standard stow and beginning at approximately L-72 hours for late show.

In Table 3.4.1-1, Payload Maximum Launch Configuration Duration, provide the flight number, payload rack/payload item, estimated turnover/last servicing timeframe, required maximum launch configuration duration, estimated extended launch delay margin, and the related technical rationale.

NOTE: Middeck payload and conditioned cargo launch delay requirements less than or equal to 30 days (for example, 24 hours, 48 hours, 72 hours, 96 hours, and 120 hours) are also to be negotiated, technically justified, and documented in Addendum Section 1.3.

3.4.1 Payload Maximum Launch Configuration Duration

The PD shall provide the following LCC information in Table 3.4.1-1 ~~Payload Maximum Launch Configuration Duration~~**for each payload item as required.**

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item/Carrier - The payload-provided hardware items and/or payload-provided carrier for which the duration limit is requested.~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # character, 50 max. #

C. ~~Maximum Launch Configuration Duration - The maximum time the payload can sustain launch configuration without physical access.~~**Estimated Turnover/Last Servicing Timeframe (L-XX) – The estimated turnover or last servicing of the payload item which starts the launch configuration duration timeframe. Identify this L-XX timeframe in months, days, or hours. # character, 50 max. #**

D. ~~Technical Rationale - A justification for the launch configuration limitation~~**Required Maximum Launch Configuration Duration (Months/Days/Hours) – The maximum time the payload can sustain launch configuration from the estimated turnover/last servicing timeframe without physical access. Identify this duration by indicating the number of months, days, or hours or by indicating "Indefinitely."**. **# character, 50 max. #**

F. Planned Launch Delay Margin – Identify the amount of planned launch delay margin by subtracting C from D or by indicating "Indefinitely." # character, 50 max. #

F. Technical Rationale – A justification for the Required maximum launch configuration duration limitation. Provide a specific justification for the duration such as the specific potential research/science loss. This should consist of several sentences to quantify the science loss. Describe what would happen and how the science, safety, or schedule would be affected if the limitation is exceeded. Identify any specific hardware inside the experiment/payload item that is causing the limitation. # character, 200 max. #

TABLE 3.4.1-1 PAYLOAD MAXIMUM LAUNCH CONFIGURATION DURATION

~~FLIGHT #~~	~~PAYLOAD ITEM /CARRIER~~	~~MAXIMUM LAUNCH CONFIGURATION DURATION (DAYS)~~	~~TECHNICAL RATIONALE~~

FLIGHT #	**PAYLOAD ITEM**	**ESTIMATED TURNOVER/LAST SERVICING TIMEFRAME (L-XX)**	**REQUIRED MAXIMUM LAUNCH CONFIGURATION DURATION (MONTHS/DAYS/HOURS)**	**PLANNED LAUNCH DELAY MARGIN**	**TECHNICAL RATIONALE**

[Expand table as required to document additional content.]

3.5 ASCENT TO ON-ORBIT PAYLOAD RESOURCE REQUIREMENTS

This section documents on a flight basis, the resource transportation, payload transport and transfer, and flight crew time requirements from pre-Payload Bay Door (PLBD) closure to the completion of payload **assembly/**installation ~~into the ISS~~. The PD will specify in the subsequent tables, by flight: the transport, payload transfer, and the flight crew time requirements.

3.5.1 Ascent to On-Orbit Payload Resource Table

The PD shall provide the following information in Table 3.5.1-1, Resource Transportation Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item - The payload-provided hardware item(s) requiring ascent resources.~~

B. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # carry-over list from Table 3.1.2-1; applies only for items listed as powered in Table 3.1.2-1. #

~~C. Payload Carrier - The locker which is used as a carrier for transporting the payload to the ISS. the locker may be an ISSP-provided MDL or a payload-provided single or double MDLE.~~

~~D~~**C**. Resource - The power ~~(Watts)~~ **(kw)**, command/data (Megab**its**~~ytes~~-per-second (Mbps)), telemetry (Mbps), and heat removal **method** ~~(Watts)~~ (kw or kg/hour) needed to be provided by the carrier vehicle to support **the payload during each transportation phase to support** payload operations.

D. Pre-PLBD Closure - The average and peak resource needed during period of time from payload insertion into the Orbiter bay to PLBD closure for flight. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. # numeric, 99999.999 max. #

E. Post-PLBD Closure - The average and peak resource needed during period of time from PLBD closure for flight to Solid Rocket Booster (SRB) ignition. (Ascent software configuration loading +6 at time prior to launch minus (T-) 20.) In addition, for power, indicate the length of time, in minutes, that identified payloads can be unpowered by placing this value in brackets. # numeric, 99999.999 max. #

F. Middeck Installation – For subrack payloads that fly in the Orbiter middeck, the average peak resources needed during the period of time from payload insertion into the middeck to SRB ignition. In addition, for power, indicate the length of time, in minutes, that identified payloads can be unpowered by placing the value in brackets. # numeric, 99999.999 max. #

~~E~~**FG**. Ascent - The average and peak resource needed during the period of time from ~~payload installation into the launch vehicle (prelaunch) until payload transfer to the ISS~~**SRB ignition through the establishment of a stable orbit (typically post-Orbital Maneuvering System (OMS) second burn)**. In addition, for power, indicate the length of time, in minutes, ~~that~~ identified payloads can be unpowered by placing this value in brackets. **# numeric, 99999.999 max. #**

~~G~~**H. Pre-assembly - The average and peak resource needed during period of time from just after the establishment of a stable orbit until the start of the Cargo Element (CE) deployment or assembly operations (i.e., docking). In addition, for**

power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. # numeric, 99999.999 max. #

~~H~~**I. Assembly - The average and peak resource needed during period of time from the start of the activity or assembly sequence until the completion of the CE assembly operations (i.e., docked operation, re-powering time sensitive hardware, etc.). In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. # numeric, 99999.999 max. #**

~~F~~**I.J.** Interface Routing - Indicate the interface routing based on the resource type below. **# select one from each list #**

~~1. Power: Orbiter MDK power; Other.~~

~~2. Command/Data: Portable Computer System (PCS) to MDK; Other.~~

~~3. Telemetry: PCS to MDK; Other.~~

~~4. Heat Removal: Cabin Air (Watts); Rear Duct Air (kg/hour).~~

POWER **(Select One)**	COMMAND/DATA **(Select One)**	TELEMETRY **(Select One)**	HEAT REMOVAL **(Select One)**
Orbiter Middeck Power	MPLM MDM to Payload	MPLM MDM to Payload	Middeck Cabin Air
Cabin ~~P/L~~**Payload** Bus to PCS	PCS to Middeck	PCS to Middeck	Middeck Rear Duct Air
Safing	Other **(describe)**	Other **(describe)**	MPLM to LTL
MPLM to Payload			Other **(describe)**
Other **(describe)**			

[Description field is character, 200 max.]

~~TABLE 3.5.1-1 RESOURCE TRANSPORTATION REQUIREMENTS~~

~~FLIGHT #~~	~~PAYLOAD ITEM~~	~~PAYLOAD CARRIER~~	~~RESOURCE~~	~~ASCENT (AVERAGE/PEAK)~~	~~INTERFACE ROUTING~~

~~[Expand table as required to document additional content.]~~

TABLE 3.5.1-1 RESOURCE TRANSPORTATION REQUIREMENTS

FLIGHT #	PAYLOAD ITEM	RESOURCE	PRE-PLBD CLOSURE	POST-PLBD CLOSURE	MIDDECK INSTALLATION	ASCENT	PRE-ASSEMBLY	DURING ASSEMBLY	INTERFACE ROUTING

[Expand table as required to document additional content.]

3.5.2 Transport and Transfer Requirements

PD shall provide the following information in Table 3.5.2-1, Transport and Transfer Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item - The payload-provided hardware items to be transported and transferred to the ISS (e.g., samples, tools, payload-provided experiment units, etc.).~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # carry-over list from Table 3.1.2-1 #

~~C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting and transferring the payload to the ISS. The locker may be an ISSP-provided MDL or a payload-provided MDLE. For lockers, specify powered or unpowered (P or UP) by the locker designation (Example: MDL (UP), MDLE (P), etc.). If the payload carrier is not known, this cell should be left blank pending analysis to determine the appropriate carrier.~~

~~D~~**C**. Description of Transport Requirements - A description of the special requirements, if any, for the transportation of the payload hardware to ISS (e.g., launch orientation, temperature, early on-orbit requirements, special handling, etc.). **# character, 200 max. #**

~~E~~**D**. Description of Transfer Requirements - A description of the special requirements, if any, for transferring the payload hardware from the Orbiter to the ISS. **# character, 200 max. #**

TABLE 3.5.2-1 TRANSPORT AND TRANSFER REQUIREMENTS

FLIGHT #	PAYLOAD ITEM	DESCRIPTION OF TRANSPORT REQUIREMENTS	DESCRIPTION OF TRANSFER REQUIREMENTS

[Expand table as required to document additional content.]

3.5.3 Flight Crew Time Requirements

The PD shall provide the following information in Table 3.5.3-1, Flight Crew Time Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

B. Total Time During Ascent and Early On-Orbit - The total amount of crew time ~~(in hours)~~ needed to perform activities in support of payload operations during this mission phase. **The total time needed should include overhead time, e.g., to access, set up, and tear down support equipment. # numeric, 99999.999 max. #**

C. Description of Flight Crew Requirements - A description of the crew activities being performed in support of payload operations during the mission phase. **# character, 1800 max. #**

TABLE 3.5.3-1 FLIGHT CREW TIME REQUIREMENTS

FLIGHT #	TOTAL CREW TIME DURING ASCENT AND EARLY ON-ORBIT (HOURS)	DESCRIPTION OF FLIGHT CREW REQUIREMENTS

[Expand table as required to document additional content.]

SECTION 4, ON-ORBIT ISS REQUIREMENTS

This section documents the on-orbit requirements for the payload for operation in the ISS for Increment {Increment #}. This section reflects a summary of the on-orbit requirements in Addendum Section 2, Payload Planning Requirements. The PD will identify in the subsequent tables: the payload rack definition and payload carrier placement criteria, payload stowage, and on-orbit ~~payload operation performance~~ POP requirements. Details of these requirements will be further documented in one or more of the data sets.

4.1 PAYLOAD DEFINITION AND PAYLOAD CARRIER PLACEMENT

This section describes payload hardware placement criteria, if any. Table 4.1.1-1, Payload Definition and Placement Criteria, provides further details on any payload operational microgravity sensitivities. The PD will specify in the subsequent table the payload carrier and the payload placement criteria.

4.1.1 Payload Definition and Placement Criteria

The PD shall provide the following information in Table 4.1.1-1.

~~A. Payload Item - The payload-provided hardware items to be located in the ISS (e.g., samples, tools, payload-provided experiment units etc.).~~

A. Payload Item - Constitutes a ~~rack, or a~~ subrack experiment(s) or groupings of payload related items manifested separate from the rack. # carry-over list from Table 3.1.2-1. #

~~B. Payload Carrier - The locker, drawer, etc., which is used as a carrier for operating the payload on the ISS. The locker may be an ISSP-provided MDL or a payload-provided MDLE. If the payload carrier is not known, this cell should be left blank, pending analysis to determine the appropriate payload carrier.~~

~~C~~**B**. Payload Placement Criteria - Any criteria for the placement of the payload ~~item or carrier~~**item**, including any requested ~~EXPRESS Rack,~~ module, co-location requirements, special handling requirements, or operational sensitivities. Include the intended use of a temporary attachment to the payload that will extend into the aisle of the ISS lab (e.g., ergometer or glove box). **# character, 200 max. #**

~~TABLE 4.1.1-1 PAYLOAD DEFINITION AND PLACEMENT CRITERIA~~

~~PAYLOAD ITEM~~	~~PAYLOAD CARRIER~~	~~PAYLOAD PLACEMENT CRITERIA~~

~~*[Expand table as required to document additional content.]*~~

TABLE 4.1.1-1 PAYLOAD DEFINITION AND PLACEMENT CRITERIA

PAYLOAD ITEM	PAYLOAD PLACEMENT CRITERIA

[Expand table as required to document additional content.]

4.2 PAYLOAD STOWAGE REQUIREMENTS

This section documents the on-orbit stowage requirements of the payload. **This section will be completed once the analyses and negotiations of the data in Addendum Section 2, Payload Planning Requirements, are performed. Values are calculated based on a summation of the requirements defined by Section 2 of this Addendum.** The stowage requirements in this table are for those items which will be accommodated outside the ~~payload dedicated lockers or ISIS drawers located in the EXPRESS Rack~~ **experiment rack(s) that contain the payload hardware**.

The PD will define in the subsequent table, from flight to flight, if appropriate: the stowage location, the time when the stowage is needed, the volume, and a brief description of any special stowage requirements.

4.2.1 Stowage Container/Accommodation

The PD shall provide the following information in Table 4.2.1-1, Payload Stowage Requirements.

A Payload Item - Payload hardware, other than experiment rack hardware, used to support the experiment and requiring stowage outside the experiment racks. # character, 50 max. #

~~A~~**B**. Stowage Container/Accommodation - The container or location**, if known,** where the requested item will be ~~stored~~**stowed**. Below is a list of the stowage containers and locations. **# select one from list for each payload item #**

+4°C Refrigerator	-20° C Freezer	-80° C Freezer	-183° C Cryo Freezer
Incubator	~~MDL~~**ISS Locker**	ASC	Soft Stowage
Stowage Drawers	Nonhazardous Trash Container	Hazardous Trash Container	**No Preference**
Other/No Requirements			

~~B~~**C**. From Flight # - The flight number in the increment which begins when the stowage is needed. **# select one from list #**

~~C~~**D**. To Flight # - The flight number in the increment which ends when the stowage is needed. **# select one from list #**

~~D~~**E**. Volume - The ~~volume of the~~**total** stowage **volume** being requested**.** ~~if the storage container is not specified.~~ **Dimensions are recorded in the configuration data set. # numeric, 99999.999 max. #**

~~E~~**F**. Description of ~~Conditioned~~ Special Stowage Requirements **and Operationally Deployed Volume** - Any special requirements for ~~conditioned~~ stowage (e.g., hazardous materials, **environment, location, constraints,** biomedical waste, etc.) **and provide the operationally deployed volume if different from ascent/descent stowage volume provided in Table 3.1.2-1 and 5.1.2-1, Payload Hardware Description**. **# character, 200 max. #** ~~For unconditioned passive storage, any constraints concerning environment, location, or stowage in soft bags should be stated.~~

TABLE 4.2.1-1 PAYLOAD STOWAGE REQUIREMENTS

PAYLOAD ITEM	STOWAGE CONTAINER/ ACCOMMODATION	STOWAGE DURATION		STOWAGE CONTAINER/ ~~ACCOMMODATION~~ VOLUME (m^3)	DESCRIPTION OF SPECIAL STOWAGE REQUIREMENTS
		FROM FLIGHT #	TO FLIGHT #		

[Expand table as required to document additional content]

4.3 LAB/STATION SUPPORT EQUIPMENT AND ACCOMMODATIONS

The contents of this section list the LSE, SSE, ~~Payload Support Equipment and Accommodations (PSEA),~~ **and Accommodations** which are available on the ISS to support the payload operation. The PD will select from the list of those items which are required.

*4.3.1 ~~Payload~~ **Lab** Support Equipment and Accommodations for Payload Operation*

The PD shall provide the following information in Table 4.3.1-1, ~~Payload~~ **Lab** Support Equipment and Accommodations Requirements. ~~**The duration of use is captured in Table 2.3-1, On-Orbit Resource Requirements, by POP, and in Table 4.4.1-1, Increment On-Orbit Resource Requirements, as increment summation, for each item listed in Table 4.3.1-1.**~~

~~A. PSEA - Specify which of the PSEA items listed below are required to support operations of the payload.~~

~~+4 °C Refrigerator~~
~~-20 °C Freezer~~
~~-80 °C Freezer~~
~~Bar Code Reader~~
~~Battery Charger~~
~~Camera Locker~~
~~Camera, High Resolution Video~~
~~Camera, Standard Video~~
~~Camera, Still~~
~~Cleaning Equipment~~
~~DC Power Supply~~
~~Digital Thermometer~~
~~Freezer, Cryogenic Storage~~
~~Freezer, Quick/Snap Cryogenic~~
~~Function/Sweep Generator~~
~~General Purpose Hand Tools~~
~~Housekeeping Equipment~~
~~Incubator~~
~~Maintenance Work Area~~
~~Mass Measuring Device, Micro~~
~~Mass Measuring Device, Small~~
~~Microgravity Barrier~~
~~Portable Computer System~~
~~Restraints and Mobility Aids~~
~~Utility Outlet Panel~~
~~Other~~

~~Digital Multimeter~~
~~Digital Recording Oscilloscope~~
~~Digital Still Camera~~
~~Digital Storage Oscilloscope~~
~~Microscope, Compound~~
~~Microscope, Dissecting~~
~~Passive Dosimeter Reader/Annealer~~
~~pH Meter/Ion Specific Analyzer~~

A. **LSE - Specify which of the LSE items listed below are required to support operations of the payload. # select as needed from list in PDL. #**

~~ISS GENERAL PURPOSE VIDEO CAMERA~~	**Dissecting Microscope**	**Passive Dosimeters And Reader/~~ANNEALER~~**
~~Cleaning Equipment~~	**Cryogenic Storage Freezer**	**Micro Mass Measuring Device**
Compound Microscope	**Quick/Snap Cryogenic Freezer**	**Small Mass Measuring Device**
Digital Thermometer	**Incubator**	**MELFI**

~~B. Comments - Enter any notes pertaining to the use of the PSEA item, especially if the item is required during a majority of the time the payload will be operating. Indicate the approximate length of time the item will be required (e.g., need the digital thermometer and the incubator at the same time).~~

~~TABLE 4.3.1-1 PAYLOAD SUPPORT EQUIPMENT AND ACCOMMODATIONS REQUIREMENTS~~

~~PSEA~~	~~COMMENTS~~

~~[Expand table as required to document additional content.]~~

B. **~~Comments - Enter any notes pertaining to the use of the LSE item, especially if the item is required during a majority of the time the payload will be operating. Indicate the approximate length of time the item will be required (e.g., need the digital thermometer and the incubator at the same time).~~Duration – Specify the duration of time, frequency of use, and which ISS stage or Increment the LSE item will be required for operations (e.g., required for 45 minutes, once every 20 days during UF-1 stage). # character, 100 max. #**

C. **Justification/Comments – Enter a justification of what the LSE item will be used for and the payload/experiment with which it is associated. Enter any comments pertaining to use of the LSE item. #character, 200 max. #**

TABLE 4.3.1-1 LAB SUPPORT EQUIPMENT AND ACCOMMODATIONS REQUIREMENTS

~~LAB SUPPORT AND ACCOMMODATION EQUIPMENT~~ LSE ITEM	DURATION	JUSTIFICATION/COMMENTS

[Expand table as required to document additional content.]

4.3.2 ISS Support Equipment ~~and Accommodations~~ for Payload Operation

The PD shall provide the following information in Table 4.3.2-1, ISS Support Equipment Requirements.

A. Station Support Equipment Item Name – Specify each of the SSE items by part name that are required to support operations of the payload. Listed below are SSE categories and part names. For reference, SSE part names and information can be found in the JSC 28533 Flight Crew Equipment Catalog and the SSP 50477 Joint Crew Provisioning Catalog.

(1) Cleaning Equipment

a. Utensil Detergent Wipe

b. Detergent Wipe

c. Utensil Rinse Wipe Assembly

d. Disinfectant Wipe

e. Durable Wipe

f. Dry Wipe

g. Surfactant Liquid

h. Portable Wet/Dry Vacuum Cleaner

(2) Restraints and Mobility Aids

a. Small Non-Adjustable Bungee, 8 inches

b. Large Non-Adjustable Bungee, 14 inches

c. Small Adjustable Bungee, 18-36 inches

d. Large Adjustable Bungee, 36-72 inches

e. Cable Restraint, 1.75 inch ID

f. Long Duration Crew Member Restraint

g. Panel Cover, 16 x 41 inches

h. Pile Fastener Restraint

i. Rack Retention Net, 32 x 38 inches

j. Flexible Bracket

k. Multiuse Bracket

l. PGSE Desk

m. Rack Seat track Stud, 1.12 inner dia.

n. Hand Rail clamp with seta track interface

(3) Diagnostics Equipment

a. Diagnostic Caddy – HP 8116A Sweep Generator and Fluke 105B Scopemeter

b. Acoustic Meter – Portable, 20 to 14 db

c. IVA Driver/Drill

d. Maintenance Work Area

e. Power Supply – 0 to 150 V at 7A

(4) Inventory Management

a. Bar Code Reader

(5) Portable Utility Light

a. Portable Utility Light

(6) Imagery

a. Digital Still Camera

b. Still Camera (35 mm)

c. ISS General Purpose Video Camera (Digital Camcorder)

(7) IVA Hand Tools – List specific IVA tools required by part name referenced in JSC 28533.

(8) Other – List any other required certified items by part name that are not in this list.

B. Quantity – Enter the quantity of each SSE item that is required to support operations of the payload.

C. Duration – specify the duration of time, frequency of use, and which ISS Stage or increment the SSE item will be required for operations (e.g., required for 45 minutes, once every 20 days during UF-1 stage).

D. Justification/Comments – Enter a justification of what the SSE item will be used for and the payload/experiment with which it is associated. Enter any comments pertaining to use of the SSE item.

~~**The PD shall provide the following information in Table 4.3.2-1, ISS Support Equipment and Accommodations Requirements. The duration of use is captured in Table 2.3-1, by POP, and in Table 4.4.1-1, as increment summation, for each item listed in Table 4.3.2-1.**~~

~~**A. SSE - Specify which of the SSE items listed below are required to support operations of the payload.**~~

TABLE 4.3.2-1 ISS SUPPORT EQUIPMENT REQUIREMENTS

STATION SUPPORT EQUIPMENT ITEM NAME	QUANTITY	DURATION	JUSTIFICATION/COMMENTS

[Expand table as required to document additional content.]

~~General Purpose IVA Tools~~	~~Portable Utility Light~~
~~Digital Still Camera~~	~~Utility Outlet Panel~~
~~Still Camera~~	~~Crew Refrigerated Freezer~~
~~**ISS General Purpose Video Camera**~~	~~**Cleaning Equipment**~~
~~Restraints and Mobility Aids~~	~~Fluid System Servicer~~
~~Digital Recording Oscilloscope, Digital Multimeter, pH meter and Digital Thermometer (combined)~~	~~Bar Code Reader~~
~~Battery Charger~~	~~Maintenance Work Area~~
~~DC Power Supply~~	~~Function/Sweep Generator~~
~~**Batteries**~~	

~~**B. Comments - Enter any notes pertaining to the use of the SSE item, especially if the item is required during a majority of the time the payload will be operating. Indicate the approximate length of time the item will be required (e.g., need the digital thermometer and the incubator at the same time).**~~

~~TABLE 4.3.2-1 ISS SUPPORT EQUIPMENT AND ACCOMMODATIONS REQUIREMENTS~~

~~STATION SUPPORT AND ACCOMMODATION EQUIPMENT ITEM~~	~~COMMENTS~~

~~*[Expand table as required to document additional content.]*~~

4.4 ON-ORBIT RESOURCE REQUIREMENTS

This section summarizes the on-orbit resources of the payload for Increment {Increment number}. Values are calculated based on a summation of the requirements defined by Section 2 of this Addendum. These requirements include electrical power, **vacuum exhaust system, environmental control and life support systems,** ~~auxiliary power~~**thermal**, data uplink and downlink, video **uplink and downlink, payload-to-payload communications,** and crew support.

Electrical ~~energy~~ **power** is ~~energy~~ **power** required to support payload operations, in ~~kiloWatt~~**kilowatts** (kw) ~~hours (kWh)~~. **Auxiliary power is backup to the electrical power,**

in kwh. Data uplink is the total transmission of digital data from the ground to the ISS, in ~~Megabytes (MB)~~ **Megabits (Mb)**. Data downlink is the total transmission of digital data from the ISS to the ground, in Gigabytes ~~(Gb)~~ **(GB)**. Video is the total transmission of ~~analog~~ **digital** video from the ISS to the ground, in hours ~~(hrs)~~. Crew support is the total number of ISS crew hours required to support payload operations.

~~*4.4.1 Increment Resource Requirements*~~

~~The PD shall provide the following information in Table 4.4.1-1, Increment Resource Requirements.~~

~~A. Continuous Resource Requirement - Indicate if resource is required at all times.~~

~~B. Total Value - The amount of the resource required per increment in the specified units.~~

~~TABLE 4.4.1-1 INCREMENT RESOURCE REQUIREMENTS~~

~~RESOURCE~~	~~UNITS~~	~~CONTINUOUS RESOURCE REQUIRED (YES/NO)~~	~~TOTAL VALUE~~
~~Electrical Power~~	~~kW hours~~		
~~Data Uplink~~	~~Mb~~		
~~Data Downlink~~	~~Gb~~		
~~Video~~	~~hours~~		
~~Crew Support~~	~~hours~~		

~~*[Expand table as required to document additional content.]*~~

4.4.1 Increment On-Orbit Resource Requirements

The PD shall provide the following information in Table 4.4.1-1, ~~Increment~~ **Consolidated** On-Orbit **(POP-Rollup)** Resource Requirements. This section provides a summary of the ISS ~~consumable~~ resources required to support payload operations during the increment based on a summation of requirements in Section 2 of this Addendum. ~~Note that potable water must be transported to the payload by a crew member.~~ **# no data input required from the PD for this table #**

~~**A.POP ID's included**~~

The following definitions explain the column headings in Table 4.4.1-1

A. Resource – Listing of items that require data input from the PD.

B. Peak Quantity - The peak amount of the resource required in the units specified.

C. Peak Duration - The duration for the associated peak quantity in the units specified.

D. Off-Peak Quantity - The average off-peak amount of the resource required in the units specified.

E. Off-Peak Duration - The duration for the associated off-peak quantity in the units specified.

The PD shall provide the following on-orbit resource requirements:

~~F.~~A. ~~UIP~~ Power - The power drawn at the utility interface panel.

~~G.~~B. Auxiliary - The power drawn from the auxiliary power interface to maintain minimum experiment operation.

~~H.UOP Power - The power drawn from the utility outlet panel.~~

~~I.~~C. Vacuum Exhaust Rate - The rate and duration of vacuum vent.

~~J.Vacuum Exhaust Frequency - The frequency of vacuum vent.~~

~~K.~~D. ~~Vacuum Resource Frequency - The duration and frequency of vacuum use as a resource in the rack.~~Vacuum Resource Duration – The duration of vacuum use as a resource in the rack.

~~L.~~E. Moderate Temperature ~~Temp.~~ Loop Flowrate - The flowrate of fluid through the MTL in the rack and the duration of that flowrate.

~~M.~~F. Moderate Temperature ~~Temp.~~ Loop Heat Dissipation - The amount of heat dissipated into the MTL per unit of time.

~~N.~~G. Low ~~Temp.~~Temperature Loop Flowrate - The flowrate of fluid through the LTL in the rack and the duration of that flowrate.

~~O.~~H. Low Temperature ~~Temp~~ Loop Heat Dissipation - The amount of heat dissipated into the LTL per unit of time.

~~P.~~I. Latent Cabin Air Heat Dissipation - Heat with moisture (humidity) dissipated into the cabin (e.g., life sciences payloads).

~~Q~~.J. Sensible Cabin Air Heat Dissipation - Heat without moisture dissipated into the cabin.

~~R.Moderate Temp Loop Flow Control - The method of control for the flow of fluid through the MTL in the rack. Indicate whether the method of control is automatic or manual. Manual is defined as internal rack control.~~

~~S.Moderate Temp. Loop Flow Controlling Parameter - The parameter used to control the flow of fluid through the MTL in the rack. Indicate whether this parameter is the flowrate, exit temperature, or some other parameter.~~

~~T~~.K. Data Uplink - The rate and duration of data uplinked to ISS and routed to the rack via the 1553B Payload Bus.

~~U~~.L. Low Rate Data Downlink - The rate and duration of data transmitted from the rack to the ground via the ISS 1553B payload bus. The requirements should split into sub-categories: Payload Health and Status and low rate telemetry.

~~V~~.M. Medium Rate Data Downlink - The rate and duration of data transmitted from the rack to the ground via the ISS payload ethernet bus.

(1) Words per packet

(2) Packets per second and its duration

(3) Duration between sessions

~~W~~.N. High Rate Data Downlink/Digitized Video Rate/Duration - The rate and duration of data transmitted from the rack to the ground via the ISS high rate data link.

~~X.Video UplinkDuration - The rate and duration of video uplinked to ISS and routed to the rack via the ISS video system.~~

~~Y.Video DownlinkDuration - The rate and duration of video transmitted from the rack to the ground via the ISS video system.~~

~~Z~~.O. Video Downlink Bit and Frame Field Data – The bit and frame field size of data transmitted via the analog camera through the ISS Video Baseband Signal Processor.

~~AA.Video Transfer to Another Rack - The rate and duration of video transmitted to another ISS rack.~~

~~BB.~~P. Low Rate Data Transfer to Another Rack - The rate and duration of data transmitted to another rack via the ISS 1553B payload bus.

~~CC.~~Q. Medium Rate Data Transfer to Another Rack - The rate and duration of data transmitted to another rack via the ISS payload ethernet bus.

(1) Words per packet

(2) Packets per second and its duration

(3) Duration between sessions

~~DD.~~R. High Rate Data Transfer to Another Rack - The rate and duration of data transmitted to another rack via the ISS high rate data link.

~~EE.~~S. Crew Support - The number of crew persons and duration required.

~~FF.Gaseous Nitrogen Consumption - The aggregate amount of gaseous nitrogen consumed.~~

~~GG.Argon Consumption - The aggregate amount of argon consumed.~~

~~HH.Helium Consumption - The aggregate amount of helium consumed.~~

~~II.Carbon Dioxide Consumption - The aggregate amount of carbon dioxide consumed.~~

~~JJ.Potable Water Consumption - The aggregate amount of potable water consumed.~~

~~KK.Support Equipment - List LSE or SSE to be used and the duration of use (minutes/hours/days). One item per line.~~

***Off-Peak Power Quantity is defined as the nominal continuous power drawn by a given payload configuration as defined by the POP ID. If there is a minor variation in power consumption within the given POP ID, the normalization (or average) of the power drawn is acceptable.**

Peak power quantity is defined as the maximum power drawn, above the nominal draw, which occurs for greater than ten milliseconds during the POP ID.

TABLE 4.4.1-1 ~~INCREMENT~~CONSOLIDATED ON-ORBIT (POP-ROLLUP) RESOURCE REQUIREMENTS (Sheet 1 of 2)

~~POP ID:~~ RESOURCE	PEAK		OFF-PEAK	
	QUANTITY	DURATION	QUANTITY	DURATION
UIP Power (~~kw~~W and hours)				
Auxiliary (~~kw~~W and hours)				
~~UOP Power (kw and hours)~~				
Vacuum Exhaust Rate (kg/minute and min)				
~~Vacuum Exhaust Frequency (# of times per POP)~~				
Vacuum Resource Duration (min) ~~Frequency (# of times per POP and min)~~				
Moderate Temperature~~.~~ Loop Flowrate (kg/hr and hours)				
Moderate Temp~~.~~erature Loop Heat Rejection (Watts and hours)				
Low Temperature Loop Flowrate (kg/hr and hours)				
Low Temperature Loop Heat Rejection (Watts and hours)				
Latent Cabin Air Heat Dissipation (Watts and hours)				
Sensible Cabin Air Heat Dissipation (Watts and hours)				
~~Moderate Temp. Loop Flow Control (indicate whether automatic or manual)~~				
~~Moderate Temp. Loop Flow Controlling Parameter (indicate whether flow rate, exit temp., or other)~~				
Data Uplink (kbps and seconds)				
Low Rate Data Downlink Rate/Duration (kbps and seconds) A. Payload Health and Status B. Low Rate Telemetry				

TABLE 4.4.1-1 CONSOLIDATED ON-ORBIT (POP-ROLLUP) RESOURCE REQUIREMENTS (Sheet 2 of 2)

	PEAK		OFF-PEAK	
	QUANTITY	DURATION	QUANTITY	DURATION
Medium~~.~~ Rate Data Downlink Rate/Duration ~~(Mbps and seconds)~~ A. Words per packet B. Packets per second C. Duration between sessions (sec)				
High Rate Data Downlink/Digitized Video Rate/Duration (Mbps and seconds)				
~~Video Uplink/Duration (Mbps and seconds)~~				
~~Video Downlink/Duration (Mbps and seconds)~~				
Video Downlink Bit & Frame Field Data and seconds Select from the following: 6 bit, 30 full frame fields/sec;/Secs. 6 bit, 30 half-frame fields/sec;/Secs. 6 bit, 15 half-frame fields/sec;/Secs. 6 bit, 7.5 half-frame fields/sec;/Secs. 6 bit, 1.875 half frame fields/sec; Secs. 8 bit, 30 full frame fields/sec;/Secs. 8 bit, 30 half-frame fields/sec;/Secs. 8 bit, 15 half-frame fields/sec;/Secs. 8 bit, 7.5 half-frame fields/sec;/Secs. 8 bit 1.875 half frame fields/sec./Secs.				
~~Video Transfer to Another Rack (Mbps and seconds)~~				
Low Rate Data Transfer to another Rack (kbps and seconds)				
Med. Rate Data Transfer to another Rack ~~(Mbps and seconds)~~ A. Words per packet B. Packets per second C. Duration between sessions (sec)				
High Rate Data Transfer to another Rack (Mbps and seconds)				
Crew Support (# persons and minutes)				

[Expand table as required to document additional content~~ for each POP ID.~~]

~~4.5 ON-ORBIT CONSUMABLE REQUIREMENTS~~

~~This section provides a summary of the ISS consumable resources required to support payload operations during the increment based on a summation of requirements in Section 2.0 of this Addendum.~~

~~NOTE: Potable water must be transported to the payload by a crewmember.~~

~~A. Volume - The total volume of the selected ISS consumable required for the payload.~~

~~TABLE 4.5.1-1 ON-ORBIT CONSUMABLE SUMMARY~~

~~ISS-PROVIDED CONSUMABLE~~	~~VOLUME (m^3)~~
~~Gaseous Nitrogen (GN_2)~~	
~~Argon (Ar)~~	
~~Helium (He)~~	
~~Carbon Dioxide (CO_2)~~	
~~Potable Water~~	

4.5 INCREMENT ON-ORBIT CONSUMABLE REQUIREMENTS

The PD shall provide the following increment on-orbit consumable requirements in Table 4.5-1, ~~Increment~~Consolidated On-Orbit ~~Resource~~Consumable Requirements. This section provides a summary of the ISS consumables required to support payload operations during the increment. It is a summation of requirements in Section 2 of this Addendum. # No data input required from the PD for this table. #

NOTE: Potable water must be transported to the payload by a crewmember.

~~A.POP ID - A short title or identifier for each type of payload operation.~~

~~B.~~A. Peak Quantity - The peak amount of the resource required in the units specified.

~~C.~~B. Peak Duration - The duration for the associated peak quantity in the units specified.

~~D.~~C. Off-Peak Quantity - The average off-peak amount of the resource required in the units specified.

~~E.~~D. Off-Peak Duration - The duration for the associated off-peak quantity in the units specified.

~~F.~~E. Gaseous Nitrogen Consumption - The aggregate amount of gaseous nitrogen ~~consumed~~used.

~~G.~~F. Argon Consumption - The aggregate amount of argon used~~consumed~~.

~~H.~~G. Helium Consumption - The aggregate amount of helium used~~consumed~~.

~~I.~~H. Carbon Dioxide Consumption - The aggregate amount of carbon dioxide used~~consumed~~.

~~J.~~I. Potable Water Consumption - The aggregate amount of potable water used~~consumed~~.

~~K.Support Equipment - List Laboratory Support Equipment (LSE) or Station Support Equipment (SSE) to be used and the duration of use (minutes/hours/days). One item per line.~~

~~K.~~J. Oxygen Consumption – The aggregate amount of oxygen consumed from the atmosphere for the POP (e.g., life sciences payload)

~~L.~~K. Air Consumption – The aggregate amount of cabin air that is vented overboard due to payload operations for the POP.

~~M.~~L. Carbon Dioxide Addition – The aggregate amount of cabin air that is vented overboard due to payload operations for the POP.

~~N.~~M. Orbiter Transferred Water Consumption – The aggregate amount of Orbiter transferred water that is used for the POP. The input shall also specify if the biocide in the Orbiter transferred water will be iodine (1-4 ppm iodine) or silver (0.3 - 0.5 ppm silver) or no biocide at all.

~~O.~~N. Partial Pressure of Carbon Dioxide Level – The requested unique average and peak partial pressure of carbon dioxide levels in the cabin aisle way for the POP. The nominal ISS partial pressure of carbon dioxide levels in the cabin aisle way is a daily average of 5.3 mmHg with a peak of ≤ 7.6 mmHg.

~~P.~~O. Condensate Absorption – The aggregate amount of water vapor removed from the atmosphere for the POP.

TABLE 4.5-1 ~~INCREMENT~~CONSOLIDATED ON-ORBIT (POP-ROLLUP) CONSUMABLE REQUIREMENTS

~~POP ID:_____~~	PEAK		OFF-PEAK	
	QUANTITY	DURATION	QUANTITY	DURATION
Gaseous Nitrogen Consumption (kg)				
Argon Consumption (kg)				
Helium Consumption (kg)				
Carbon Dioxide Consumption (kg)				
Potable Water Consumption (kg)				
~~Support Equipment and Duration of Use (minutes/hours/days)~~				

	PEAK		OFF-PEAK	
	QUANTITY	DURATION	QUANTITY	DURATION
Gaseous Nitrogen Consumption (kg)				
Argon Consumption (kg)				
Helium Consumption (kg)				
Carbon Dioxide Consumption (kg)				
Potable Water Consumption (kg)				
Oxygen Consumption (kg)				
Air Consumption (kg)				
Carbon Dioxide Addition (kg)				
Orbiter Trfd Water Consumption (kg)				
Partial Pressure of Carbon Dioxide (mmHg)				
Condensate Absorption (kg)				

[Expand table as required to document additional content.] ~~for each POP ID.~~]

SECTION 5, RETURN REQUIREMENTS

This Section ~~5.0, Return Requirements,~~ documents **the** ~~late on-orbit, descent, and landing requirements associated with the transportation of the payloads from the ISS. This section reflects a summary of the return requirements in Addendum, Section 2, Tactical~~ **Payload** ~~Planning Requirements~~**payload hardware transportation scenario from the ISS and post landing processing requirements. It also contains a description of the payload hardware with configuration data sets**. The PD will identify in the subsequent tables, per flight, the payload hardware and the return requirements. Details of these requirements will be further documented in the various payload-specific data sets.

5.1 PAYLOAD ACTIVITIES AND HARDWARE

This section provides a scenario describing the landing activities on a flight-by-flight basis during this increment and provides a brief description of the payload hardware being transported from ISS.

~~*1.1.1*~~***5.1.1*** *Return Scenario Activities*

The PD shall provide the following information in Table 5.1.1-1, Return Scenario Activities.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

B. ~~Description of Payload Return Activities - A scenario which describes deintegration processing and the transportation of the payload hardware from the ISS by flight. This will include a summary or brief description of the assembly, post-assembly, descent and post-flight activities~~**On-orbit to postlanding activities – Defined by flight the scenario describing transportation of the payload hardware from the ISS which includes any reactivation of time sensitive hardware. Define by flight the scenario describing postlanding processing from wheel stop to hardware turnover to the PD**. **# character, 1800 max. #**

TABLE 5.1.1-1 RETURN SCENARIO ACTIVITIES

FLIGHT #	DESCRIPTION OF RETURN ACTIVITIES

[Expand table as required to document additional content.]

5.1.2 Payload Hardware Description

The PD shall provide the following information in Table 5.1.2-1, Payload Hardware Description.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item - The payload-provided hardware item(s) to b transported from the ISS (e.g., samples, tools, payload-provided experiment units, etc.).~~

B. Payload Item - Constitutes a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # character, 50 max. #

C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload to the ISS. # select one from list #

ISPR	**EXPRESS Rack**	**Transportation Rack**
Powered Single MDL	**Powered Double MDLE**	**Unpowered Single MDL**
Unpowered Double MDLE	**4-Panel Unit ISIS Drawer**	**8-Panel Unit ISIS Drawer**
12-Panel Unit ISIS Drawer	**Stowage Tray**	**+4 °C Refrigerator**
ASC/Softpack	**-20 °C Freezer**	**-80 °C Freezer**
-183 °C Cryo Freezer	**Undefined/Loose Items**	**Other**
No Preference		

D. Payload Carrier Location - The location of the payload carrier (e.g., MDK, MPLM, no preference). # select one from list #

~~**B. Payload Item Location - The location of the hardware item (e.g., middeck, MPLM, ISPR, etc.).**~~

~~C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload from the ISS. The locker may be an ISSP-provided MDL or a payload-~~

~~provided MDLE. For lockers, specify powered or unpowered (P or UP) by the locker designation (example: MDL (UP), MDLE (P) etc.). If the payload carrier is not known, this cell should be left blank, pending analysis to determine the appropriated payload carrier.~~

~~Single MDL *(ISSP-provided)*~~	~~Single MDLE *(PD-provided)*~~	~~Double MDLE *(PD-provided)*~~	
~~4-panel-unit ISIS Drawer~~	~~ASC/Softpack~~	~~Undefined (loose items)~~	~~Other~~
~~+4 °C Refrigerator~~	~~-20 °C Freezer~~	~~-80 °C Freezer~~	~~-183 °C Cryo Freezer~~

~~**C. Payload Item - Constitutes a rack, or a subrack experiment(s) or groupings of payload related items manifested separate from the rack.**~~

~~**ISPR**~~	~~**EXPRESS Rack**~~	~~**Transportation Rack**~~	
~~**Powered Single MDL**~~	~~**Powered Double MDLE**~~	~~**Unpowered Single MDL**~~	~~**Unpowered Double MDLE**~~
~~**Powered Single MDLE**~~	~~**Unpowered Single MDLE**~~	~~**Quad Locker**~~	
~~**4-Panel Unit ISIS Drawer**~~	~~**8-Panel Unit ISIS Drawer**~~	~~**12-Panel Unit ISIS Drawer**~~	~~**Stowage Tray**~~
~~**+4 ºC Refrigerator**~~	~~**-20 ºC Freezer**~~	~~**-80 ºC Freezer**~~	~~**-183ºC Cryo Freezer**~~
~~**ASC/Softpack**~~	~~**Undefined/Loose Items**~~	~~**Other**~~	

~~D. Payload Carrier Location - The required location of the payload carrier (e.g., MDK, MPLM, N/A (no requirement), etc.).~~

E~~D~~**E**. Volume - The volume of the payload items ~~**carrier inclusive of the payload hardware**~~. If the payload ~~carrier~~ **item** is ~~a single or double~~ **an ISPR, a transportation rack,** MDL or ~~MDLE~~, or a**n** ISIS drawer, this cell ~~may~~ is to be left blank. **# numeric, 99999.999 max. #**

F~~E~~**EF**. Mass - The mass of the payload item~~s~~ **listed in the table.** ~~listed including the mass of any payload-provided carriers or payload-dedicated ISSP carriers (e.g., ISSP MDL's ISIS drawers, etc., listed as payload -dedicated in Table 3.2.2-1, Program furnished Equipment Flight Requirements.) inclusive of the payload hardware listed in the table.~~**# numeric, 99999.999 max. #**

G~~F~~**FG**. Additional Information - Information such as unique shapes and sizes, hazardous materials, etc., which might be pertinent to the ~~ISSP~~**ISS Program**. **# character, 500 max. #**

H~~G~~**GH**. Total Mass/Flight - The total mass of the hardware item(s) ~~inclusive of the payload~~ hardware, by flight. **# numeric, 99999.999 max. #**

~~TABLE 5.1.2-1 PAYLOAD HARDWARE DESCRIPTION~~

~~FLIGHT #~~	~~PAYLOAD ITEM~~	~~PAYLOAD CARRIER~~	~~PAYLOAD CARRIER LOCATION (MDK, MPLM, N/A, ETC.)~~	~~VOLUME (m^3)~~	~~MASS (kg)~~
			~~Total Mass/Flight:~~		

			~~Total Mass/Flight:~~		

~~[Add notes as required to document additional information.)~~
~~[Expand table as required to document additional content.]~~

TABLE 5.1.2-1 PAYLOAD HARDWARE DESCRIPTION

~~FLIGHT #~~	~~PAYLOAD ITEM~~	~~PAYLOAD ITEM LOCATION (MDK, MPLM, ETC.)~~	~~VOLUME (m^3)~~	~~MASS (kg)~~	~~ADDITIONAL INFORMATION~~
			~~Total Mass/Flight:~~		

FLIGHT #	PAYLOAD ITEM	PAYLOAD CARRIER	PAYLOAD CARRIER LOCATION (MDK, MPLM, ETC.)	VOLUME (m^3)	MASS (kg)	ADDITIONAL INFORMATION
			Total Mass/Flight:			

[Expand table as required to document additional content.]

5.2 ON-ORBIT TO RETURN PAYLOAD REQUIREMENTS

This section documents, on a flight-by-flight basis, the resource transportation, payload transport and transfer, and flight crew time requirements from payload de-assembly/installation to post-flight. The PD will specify in the subsequent tables, by flight: the transport, payload transfer, and the flight crew time requirements.

5.2.1 Resource Transportation Requirements

The PD shall provide the following information in Table 5.2.1-1, Resource Transportation Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item - The payload-provided hardware items to be transported from the ISS (e.g., samples, tools, payload-provided experiment units, etc.).~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack (applies only for items listed as powered in Table 3.1.2-1). # carry-over list from Table 5.1.2-1. #

~~C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload during return from the ISS. The locker may be an ISSP-provided MDL or a payload-provided MDLE. For lockers, specify powered or unpowered (P or UP) by the locker designation (example: MDL (UP), MDLE (P), etc.). If the payload carrier is not known, this cell should be left blank pending analysis to determine the appropriate payload carrier.~~

~~D~~**C.** ~~Average (Peak)~~ Resource - The power **(Watts)**, command/data **(Mbps)**, telemetry **(Mbps)**, and heat removal **(Watts)** needed during each transportation phase to be provided by the carrier vehicle to support payload operations. **# numeric, 99999.999 max. #**

~~E~~**D**. Assembly - The average and peak resource needed during the period of time from the start of the activity or assembly sequence until the completion of the payload assembly operations, i.e., undocked operations. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. **# numeric, 99999.999 max. #**

~~F~~**E**. Post-assembly - The average and peak resource needed during period of time from the completion of the payload assembly operations (undocking) to start of preparation for entry. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. **# numeric, 99999.999 max. #**

~~G~~**F**. Descent - The average and peak resource needed during period of time from start of preparation for entry through wheelstop. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. **# numeric, 99999.999 max. #**

~~H~~**G**. Post-flight - The average and peak resource needed during period of time from wheelstop to the removal of a return complement. The peak resource requirement will be identified in parentheses. In addition, for power, indicate the length of time, in minutes, identified payloads can be unpowered by placing this value in brackets. **# numeric, 99999.999 max. #**

~~I~~**H**. Interface Routing - Indicate the interface routing based on the resource type below: **# select one from list #**

~~(1) Power: Orbiter MDK power; Cabin Payload (PL) Bus to PCS; Safing; Other.~~

~~(2) Command/Data: PCS to MDK; Other.~~

~~(3) Telemetry: PCS to MDK; Other.~~

~~(4) Heat Removal: MDK Cabin Air; MDK Rear Duct Air.~~

POWER (Select One)	COMMAND/DATA (Select One)	TELEMETRY (Select One)	HEAT REMOVAL (Select One)
Orbiter Middeck Power	MPLM MDM to Payload	MPLM MDM to Payload	Middeck Cabin Air
Cabin ~~P/L~~Payload Bus to PCS	PCS to Middeck	PCS to Middeck	Middeck Rear Duct Air
Safing	Other (describe)	Other (describe)	MPLM to LTL
MPLM to Payload			Other (describe)
Other (describe)			

If other is selected, description is needed. # Character, 200 max. #

TABLE 5.2.1-1 RESOURCE TRANSPORTATION REQUIREMENTS

FLIGHT #	PAYLOAD ITEM	RESOURCE	ASSEMBLY AVERAGE (PEAK)	POST-ASSEMBLY AVERAGE (PEAK)	DESCENT AVERAGE (PEAK)	POST-FLIGHT AVERAGE (PEAK)	INTERFACE ROUTING

[Expand table as required to document additional content.]

5.2.2 Transport and Transfer Requirements

The PD shall provide the following information in Table 5.2.2-1, Transport and Transfer Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

~~B. Payload Item - The payload-provided hardware items to be transferred and transported from the ISS (e.g., samples, tools, payload-provided experiment units, etc.).~~

B. Payload Item - Constitutes ~~a rack, or~~ a subrack experiment(s) or groupings of payload related items manifested separate from the rack. # carry-over list based on Table 5.2.1-1. #

~~C. Payload Carrier - The locker, drawer, etc., which is used as a carrier for transporting the payload during return from the ISS. The locker may be an ISSP-provided MDL or a payload-provided MDLE. For lockers, specify powered or unpowered (P or UP) by the locker designation (example: MDL (UP), MDLE (P), etc.). If the payload carrier is not known, this cell should be left blank pending analysis to determine the appropriate payload carrier.~~

~~D~~**C**. Description of Transport Requirements - A description of the special requirements, if any, for the transportation of the payload hardware from ISS to landing (e.g., landing orientation, temperature, late on-orbit requirements, special handling, whether the MDL cooling configuration is front or rear cooled, mounting, etc.). **# character, 200 max. #**

~~E~~**D**. Description of Transfer Requirements - A description of the special requirements, if any, for transferring the payload hardware from the ISS to the Orbiter. **# character, 200 max. #**

~~TABLE 5.2.2-1 TRANSPORT AND TRANSFER REQUIREMENTS~~

~~FLIGHT #~~	~~PAYLOAD ITEM~~	~~PAYLOAD CARRIER~~	~~DESCRIPTION OF TRANSPORT REQUIREMENTS~~	~~DESCRIPTION OF TRANSFER REQUIREMENTS~~

~~*[Expand table as required to document additional content.]*~~

TABLE 5.2.2-1 TRANSPORT AND TRANSFER REQUIREMENTS

FLIGHT #	PAYLOAD ITEM	DESCRIPTION OF TRANSPORT REQUIREMENTS	DESCRIPTION OF TRANSFER REQUIREMENTS

[Expand table as required to document additional content.]

5.2.3 Flight Crew Time Requirements

The PD shall provide the following information in Table 5.2.3-1, Flight Crew Time Requirements.

A. Flight # - The requested flight identification number (e.g., UF-6, 7-PROG). **# select one from list #**

B. Total Crew Time During Descent - The total amount of crew time needed to perform activities in support of payload operations during descent. **# numeric, 99999.999 max. #**

C. Description of Flight Crew Requirements - A description of the crew activities to be performed in support of payload operations. **# character, 1800 max. #**

TABLE 5.2.3-1 FLIGHT CREW TIME REQUIREMENTS

FLIGHT #	TOTAL CREW TIME DURING DESCENT (HOURS)	DESCRIPTION OF FLIGHT CREW REQUIREMENTS

[Expand table as required to document additional content.]

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SECTION 6, ~~TRAINING REQUIREMENTS~~PAYLOAD DEVELOPER-PROVIDED GROUND SUPPORT PERSONNEL AND CREW TRAINING REQUIREMENTS

This section describes the ~~basic~~ **top-level** training requirements ~~of~~ **for the Ground Support Personnel (GSP) and crew involved with** the payload. ~~It addresses the training required of the ISS and Shuttle crew and Ground Support Personnel (GSP), as well as any special or unique training requirements of other individuals involved in the operation of the payload.~~ **This section documents the training requirements that the PD will provide.**

The PD will ~~identify, in the subsequent tables:~~ **describe these** ~~top-level~~ training requirements, ~~the integrated training location, the complexity of training, the crew training hardware, and the supporting equipment and services~~ **in the subsequent tables and provide the flights affected, the trainees involved, and the training location**. ~~Details of these~~ **Detailed** training requirements will be further documented in the payload training ~~Requirements~~ data set.

This section does not include requirements for training that will be provided to the PD by the POIF. These requirements will be determined by the Training Strategy Team (TST).

~~6.1 PAYLOAD DEVELOPER-PROVIDED CREW TRAINING REQUIREMENTS~~

~~This section describes the top-level training requirements for the ISS and transport vehicle crews involved with the payload. The PD will describe these specific training requirements in the subsequent tables and provide the flights affected, the trainees involved, and the training location. Details of these training requirements will be further documented in the Payload Training Data Set.~~

6.1 GROUND SUPPORT PERSONNEL AND CREW TRAINING REQUIREMENTS

The PD shall provide the following information in Table 6.1-1, Payload Developer-Provided Ground Support Personnel and Crew Training Requirements.

A. Flight # - The first flight or the flight increments affected by the training requirement (e.g., UF-1, 7A). # select one from list #

B. Trainee Classification - The individual(s) requiring training in support of the payload operations, chosen from the following list: # select items as required from list #

(1) Launch/Landing Site GSP - loading/unloading operations; special ground processing

(2) Telescience Support Center (TSC) Personnel - ground control and monitoring of individual payload

(3) Crew Instructors - provide training to crew members

(4) Other - other ground support personnel

(5) ISS Crew/SSP Crew

C. Training Hours - Estimate of number of hours required for this training. # numeric, 99999.999 max. #

D. Training Timeframe - The timeframe during which the training needs to occur. The following is a list of training dates for reference: # character, 100 max. #

(1) Crew payload training begins at Increment minus (I-) 18 months.

(2) Instructor training begins 3three months prior to crew training.

(3) GSP training begins at L-12 months.

E. Training Location - The location where the training is to occur. This will include on board training for the crew when applicable. # character, 100 max. #

TABLE 6.1-1 PAYLOAD DEVELOPER-PROVIDED GROUND SUPPORT PERSONNEL AND CREW TRAINING REQUIREMENTS

FLIGHT #	TRAINEE CLASSIFICATION	TRAINING HOURS	TRAINING TIMEFRAME	TRAINING LOCATION

[Expand table as required to document additional content.]

~~*6.1.1 Crew Training Requirements*~~

~~The PD shall provide the following information in Table 6.1.1-1, Crew Training Requirements.~~

~~A. Flight # - The first flight or the flight increments affected by the training requirement (e.g., UF-1, 7A).~~

~~B. Training Classification - The type of crew training being supported, chosen from the following list:~~

~~(1) Payload Orientation (including science background, systems overview, and operations overview).~~

~~(2) Payload Operations (including nominal operations and malfunction operations).~~

~~(3) Science Applications (hands-on training on science skills to support payload).~~

~~(4) Payload Transfer (operations to transfer and checkout equipment between transport vehicle and ISS).~~

~~(5) Payload Transport (operations required while payload is on the transport vehicle).~~

~~(6) Other.~~

~~C. Training Hours - Estimate of number of hours required for this training. Note that the NASA Payload Training Implementation Plan (NPTIP) has information on estimating crew training hours for a range of payloads.~~

~~D. Training Timeframe - The timeframe during which the training needs to occur. Note that for crew availability reasons, training should occur as early as possible. The following is a list of training dates for reference.~~

~~(1) Advanced (nonincrement-specific) crew training begins at Increment minus (I-) 24 months.~~

~~(2) Increment-specific crew payload training begins at I-18 months.~~

~~(3) Training with the Integrated Simulator at the Space Station Training Facility (SSTF)/Payload Training Center (PTC) begins at I-12 months.~~

E. Training Location - The location where the training is to occur (e.g., SSTF/PTC, Space Station Man Training Facility (SSMTF). Note that crew training will occur at Johnson Space Center (JSC) unless a waiver is granted by the Payload Training Integration Manager (PTIM) to allow for training at other facilities for special circumstances.

TABLE 6.1.1-1 CREW TRAINING REQUIREMENTS

FLIGHT #	TRAINING CLASSIFICATION	TRAINING HOURS	TRAINING TIMEFRAME	TRAINING LOCATION

[Expand table as required to document additional content.]

6.2 PAYLOAD DEVELOPER-PROVIDED GROUND SUPPORT PERSONNEL TRAINING REQUIREMENTS

This section describes the top-level training requirements for the GSP involved with the payload.

The PD will describe these training requirements in the subsequent tables and provide the flights affected, the trainees involved, and the training location. Detailed training requirements will be further documented in the Payload Training Data Set.

6.2.1 Ground Support Personnel Requirements

The PD shall provide the following information in Table 6.2.1-1, Ground Support Personnel Training Requirements.

A. Flight # - The first flight or the flight increments affected by the training requirement (e.g., UF-1, 7A).

B. Trainee Classification - The individual(s) requiring training in support of the payload operations, chosen from the following list:

(1) Launch/Landing Site GSP - Loading/unloading operations; special ground processing.

(2) Payload Operations Integration Control (POIC) Cadre - Ground control and monitoring of integrated payloads; development and execution of payload science timeline.

(3) User Operations Facility (UOF) Personnel - Ground control and monitoring of individual payload.

(4) Crew Instructors - Provide training to crewmembers.

(5) Other - Other GSP.

C. Training Hours - Estimate of number of hours required for this training.

D. Training Timeframe - The timeframe during which the training needs to occur. The following is a list of training dates for reference:

(1) Crew payload training begins at I-18 months.

(2) Instructor training begins 3 months prior to crew training.

(3) GSP training begins at I-12 months.

E. Training Location - The location where the training is to occur (e.g., SSTF/PTC, SSMTF). Note that crew training will occur at JSC unless a waiver is granted by the PTIM to allow for training at other facilities for special circumstances.

TABLE 6.2.1-1 GROUND SUPPORT PERSONNEL TRAINING REQUIREMENTS

FLIGHT #	TRAINING CLASSIFICATION	TRAINING HOURS	TRAINING TIMEFRAME	TRAINING LOCATION

[Expand table as required to document additional content.]

6.3 TRAINING/SUPPORT HARDWARE AND SERVICES

This section contains a brief description of the training/support hardware and services necessary to support the training of personnel for payload operations. The PD shall provide in the subsequent table, by flight if appropriate, the training classification, the training/support hardware, supporting services, and the need dates. Detailed training requirements will be further documented in the Payload Training Requirements Data Set.

6.3.1 Training Support and Hardware

The PD shall provide the following information in Table 6.3.1-1, Training/Support Hardware and Services.

A. Flight # - The first flight or the flight increments affected by the training requirement (e.g., UF-1, 7A).

B. Training Classification - The crew or GSP training requirement that the hardware or service is meant to support (these should be the classifications used in Tables 6.1.1-1 and 6.2.1-1.

C. Training or Support Equipment - Training equipment used to support training for the crew or GSP (e.g., simulators, trainers, flight-like hardware, ground consoles, courseware, etc.).

D. Supporting Services - Services used to support training for the crew or GSP (e.g., telecommunications, data links, special training facilities, etc.).

E. Need Date - The date the training/support hardware or services are required to be available. The following is a list of training dates for reference:

(1) Crew payload training begins at I-18 months.

(2) Instructor training begins three months prior to crew training.

(3) Integrated simulators required at SSTF/PTC by I-15 months.

(4) GSP training begins at I-12 months.

TABLE 6.3.1-1 TRAINING/SUPPORT HARDWARE AND SERVICES

FLIGHT #	TRAINING CLASSIFICATION	TRAINING OR SUPPORT EQUIPMENT	SUPPORTING SERVICES	NEED DATE

[Expand table as required to document additional content.

SECTION 7, GROUND DATA SERVICES SUPPORT REQUIREMENTS DURING FLIGHT OPERATIONS

This section documents the top-level ground data services support requirements for Increment {Increment #}. These requirements refer to the ground support requirements needed during simulations and real-time on-orbit operations at a payload's ground operating location. These include payload unique services required if in the USOC, a TSC, or at any other operating location (e.g. network and/or hardware connectivity requirements). This section does not include requirements for KSC support. Details of these ground support requirements will be documented in the ground data services data set. In case of any variation between the data set and the EIA, the EIA shall take precedence. The PD shall identify in the subsequent tables such ground requirements requested from the ISS Program.

7.1 PAYLOAD DEVELOPER REQUESTED GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS

Significant pre-mission planning and coordination is necessary to define the requirements for ground support. The PD shall provide the following information in Table 7.1-1, Ground Data Services Requirements During Flight Operations.

A. **Ground Data Services Requirement - The type of service being requested by the PD. Choose from the following types of services: # select from list #**

(1) **Experiment science/engineering data – Any data used to support your science and/or engineering support objectives such as payload MDM Health and Status payload ancillary, broadcast ancillary, or ground ancillary data.**

(2) **Voice Loops – Includes voice loops for ground-to-ground and ground-to-space communication in support of Earth-to-Orbit Vehicle (ETOV) and on-orbit ISS operations.**

(3) **ISS Downlink Video – ISS downlink video will be broadcast video. A PD with a requirement for downlink video at an operating location other than the USOC or a TSC will be responsible for acquiring the video ground termination equipment required to receive this video.**

(4) **Ground commanding – Ability to issue an uplink command to a payload.**

TABLE 7.1-1 GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS

GROUND DATA SERVICES REQUIREMENT	LOCATION FROM	LOCATION TO	DATA RATE (kbps)	POIC PROCESS DATA	VOICE DISTRIBUTION SYSTEM	OPERATING LOCATION POINT OF CONTACT	ETOV SUPPORT ONLY
Experiment Sci/Eng Data				Y or N			
Voice Loops					Y or N		Y or N
Downlink Video							
Ground Commanding							
POIC Services							

[Expand table as required to document additional content.]

(5) **POIC services – Reference SSP 50304, POIC Capabilities Document, for a description of standard POIC provided services and interface methods.**

B. **Location From – Indicate the source location (i.e., POIC, ISS, a TSC, etc.) of the ground support requirement. # character, 30 max. #**

C. Location To – Indicate the destination location (i.e., USOC, a TSC, other operating location) of the ground support requirement for each operating location. # character, 30 max. #

D. Data Rate – Indicate the approximate total data rate of all payload-generated data streams in kbps for each location. Data rate should be calculated by multiplying the number of CCSDS packets output per second (on a per stream basis) by the maximum size of the generated CCSDS Packets. # numeric, 99999.999 max. #

E. POIC Process Data – Indicate a request for the POIC to process the experiment's science/engineering data. This request must be assessed prior to approval. (yes/no) # choose one from list #

F. Voice Distribution System – For voice requirement, indicate if each operating location has a voice distribution system. (yes/no) # choose one from list #

G. Operating Location Point of Contact – Provide the name and telephone number of the operating location point of contact responsible for configuring ground support hardware for interfacing to external services such as POIC services and network communications services. If there are multiple requirements for an operating location, the point of contact information only needs to be entered once for each location. # character, 100 max. #

H. ETOV Support Only – Indicate if this operating location will support ETOV operations only. (yes/no) # choose one from list #

7.2 ADDITIONAL REQUIREMENTS/SERVICES DURING FLIGHT OPERATIONS

The PD shall identify any additional requirements/services (i.e., program or facility-provided Telescience Resource Kit (TreK) workstation, ISS payload requirement for Shuttle services if not already identified in Table 7.1-1) for an operation location in Table 7.2-1, Additional Requirements/Services During Flight Operations. These additional requirements must be assessed for cost and schedule impacts to approval.

TABLE 7.2-1 ADDITIONAL REQUIREMENTS/SERVICES DURING FLIGHT OPERATIONS

[Expand table as required to document additional content.]

~~SECTION 7,GROUND SUPPORT REQUIREMENTSGROUND DATA SERVICES SUPPORT REQUIREMENTS DURING FLIGHT OPERATIONS~~

~~This section documents the ground **data services** support requirements needed to perform payload flight operations. These include the ground support facilities and equipment, transportation, and services (e.g., ground synchronized control testing) which are not included in the integration of the payload into the ISS. Details of these ground support requirements will be documented in the Ground Data Services Data Set. The PD shall identify in the subsequent tables such ground requirements requested from the ISSP.~~

~~7.1~~GROUND REQUIREMENTS~~GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS~~

~~This section lists the support for the ground **data services** requirements requested by the PD which are not directly associated with payload hardware. Significant pre-mission planning and coordination is necessary to define the facilities and equipment requirements for ground support. The PD will identify the ground support requirement, the quantity needed, the need dates, the location and provide a brief description of each requirement.~~

*~~7.1.1Payload Developer Requested Ground Requirements Not Associated With Payload Hardware~~ **~~Payload Developer Requested Ground Data Services Requirements Not Associated With Payload Hardware During Flight Operations~~***

~~The PD shall provide the following information in Table 7.1.1-1, Ground **Data Services** Requirements **During Flight Operations**.~~

~~A. Ground Support **Data Services** Requirement - The facility, hardware, or service being requested by the PD (e.g., data handling and archiving, communication needs both for software and hardware, baseline data collection facilities and equipment, user operation facilities, mission operation facilities, and transportation **TSCs, and Mission Operation facilities**).~~

~~B. Need Dates - The dates the support for the ground requirements are needed (e.g., UF1: L-24 months to UF1: Return plus (R+) 12 months).~~

~~C. Location - Where the ground **data services** support requirement is needed.~~

~~D. Description - A brief description of the ground support requirement.~~

~~TABLE 7.1.1.-1 GROUND REQUIREMENTS~~

~~TABLE 7.1.1-1 GROUND DATA SERVICES REQUIREMENTS DURING FLIGHT OPERATIONS~~

~~GROUND SUPPORT REQUIREMENT~~	~~NEED DATES~~	~~LOCATION~~	~~DESCRIPTION~~

~~[Expand table as required to document additional content.]~~

~~SECTION 8,SCHEDULES~~

~~This section contains schedules for the payload~~**deviations from the payload integrated schedule, detailed in Section 9.0 of the EIA Main Volume**. ~~These~~ **This** ~~includes~~ **any deviation of the** ~~payload delivery dates to the launch site, to the phased safety reviews the Interface Control Document (ICD)/data sets, and all other integration product deliveries. Commitments and services listed below~~ **agreed-to** ~~will be furnished using the best efforts of both the ISSP and PD. Detailed increment~~ **payload** ~~specific schedules will be maintained in the Payload schedule~~ **Appendix D of this Addendum. All identified deviations from the payload integrated schedule prior to the baselining of this Addendum will be recorded in Tables 8.1.1-1, Deviations from the Safety Review Schedule, and 8.2.1-1, Deviations from the Payload Integration Schedule. Subsequent deviations will be recorded and tracked in Appendix D of this Addendum.**

~~1.1SAFETY REVIEWS~~

~~This section documents the safety reviews which will require the support of the PD. The PD shall provide the payload data packs and represent the payload at the safety reviews.~~ **The PD shall document, in Table 8.1.1-1, Deviations From the Safety Review Schedule, any known deviation from their delivery dates indicated by the payload integration schedule.**

~~*1.1.1Safety Reviews* ***Deviations From The Safety Reviews Schedule***~~

~~The PD shall provide the following information in Table 8.1.1-1,~~ **Deviations From the** ~~Safety Review Schedule.~~

~~A.Date for Payload/Flight Safety Review - The estimated calendar~~ **deviated** ~~date for the Payload/Flight Safety Review.~~

~~B.Date for Ground Safety Review (GSR) - The estimated calendar~~ **deviated** ~~date for the GSR.~~

~~TABLE 8.1.1-1 SAFETY REVIEW SCHEDULE~~

~~TABLE 8.1.1-1 DEVIATIONS FROM THE SAFETY REVIEW SCHEDULE~~

~~SAFETY REVIEWS~~	~~DATE FOR PAYLOAD/ FLIGHT SAFETY REVIEW~~	~~DATE FOR GSE SAFETY REVIEW~~
~~Phase 0/1 Safety Review~~		
~~Phase 2 Safety Review~~		
~~Phase 3 Safety Review~~		

~~[Expand table as required to document additional content.]~~

~~1.2~~INTERFACE CONTROL DOCUMENT/DATA DELIVERY**~~DEVIATIONS FROM THE PAYLOAD INTEGRATION SCHEDULE~~**

~~This section lists the deliverable Data Sets and~~ **documents and the known deviation from** ~~their delivery due dates~~ **indicated by the payload integration schedule prior to the baselining of this Addendum**~~.~~

*~~1.1.1Interface Control Document/Data Delivery Schedule~~**~~Deviations From The Payload Integration Schedule~~***

~~The PD and EPIM shall provide the following information in Table 8.2.1-1, Interface Control Document/Data Set Delivery~~ **Deviations From the Payload Integration Schedule**~~.~~

~~A.Preliminary Date - The~~ **deviated** ~~date the~~ **PIM and the** ~~PD will submit the initial draft information in the data set (i.e., promote the data set from private to integrated)~~ **have reviewed, negotiated, and updated the listed document.**

~~B.Baselined Date - The~~ **deviated** ~~date the PD will submit the final updated information in the data set for baselining (i.e., promote the data set from private to integrated)~~ **document will be baselined**~~.~~

~~TABLE 8.2.1-1 INTERFACE CONTROL DOCUMENT/DATA SET DELIVERY SCHEDULE~~

~~DOCUMENT TITLE~~	~~PRELIMINARY DATE~~	~~BASELINE DATE~~
~~Interface Control Document~~		
~~Payload Verification Requirements~~		
~~Payload Configuration~~		
~~Payload Command and Data Requirements~~		
~~Ground Data Services Requirements~~		
~~Payload Planning Requirements~~		
~~Payload Operations Requirements~~		
~~Payload Training Requirements~~		
~~KSC Support Requirements~~		
~~KSC Technical Requirements~~		

~~[Expand table as required to document additional content.]~~

~~TABLE 8.2.1-1 DEVIATIONS FROM THE PAYLOAD INTEGRATION SCHEDULE~~

~~Increment Number~~ _____ **~~Flight Name~~**_____

~~DOCUMENT TITLE~~	**~~PRELIMINARY DATE~~**	**~~BASELINED DATE~~**

~~[Expand table as required to document additional content.]~~

~~NOTE: Subsequent schedule deviations post baselining of this Addendum will be recorded and tracked in Appendix D which will be baselined prior to launch.~~

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APPENDIX A

ADDENDUM
INCREMENT {INCREMENT NUMBER}

ABBREVIATIONS AND ACRONYMS

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APPENDIX A - ADDENDUM INCREMENT {INCREMENT NUMBER} ABBREVIATIONS AND ACRONYMS

~~Ar~~	~~Argon~~
ARIS	**Active Rack Isolation System**
ASC	Aisle Stowage Container
C	Centigrade
CCSDS	**Consultative Committee for Space Data Systems**
CE	**Cargo Element**
~~CO_2~~	~~Carbon Dioxide~~
Cryo	**Cryogenic**
Db	**Decibel**
~~DC~~	~~Direct Current~~
EEOM	**Early End of Mission**
EIA	EXPRESS Integration Agreement
EPIM	EXPRESS Payload Integration Manager
EOM	**End of Mission**
ERP	**EXPRESS Rack Payload**
ETOV	**Earth-to-Orbit Vehicle**
EXPRESS	EXpedite the PRocessing of Experiments to Space Station
Flt ~~Flight~~	~~Flt~~**Flight**
GB	Gigabytes
~~GN_2~~	~~Gaseous Nitrogen~~
GSE	Ground Support Equipment
GSP	**Ground Support Personnel**
GSR	Ground Safety Review
GSRP	**Ground Safety Review Panel**
~~He~~	~~Helium~~
HP	**Hewlett-Packard**
HRFM	**High Rate Frame Multiplexer**
hrs	hours

I-	Increment minus
ICD	Interface Control Document
ID	Identification
ISIS	International Subrack Interface Standard
ISPR	**International Standard Payload Rack**
ISS	International Space Station
~~ISSP~~	~~International Space Station Program~~
IVA	**Intravehicular Activity**
JSC	Johnson Space Center
kbps	kilobits-per-second
kg	kilogram
KSC	Kennedy Space Center
kw	Kilowatts
kwh	**Kilowatt hours**
~~lb~~	~~pound~~
L	Launch
L-	Launch minus
L+	Landing plus
LAN	**Local Area Network**
LCC	Launch Commit Criteria
LSE	Laboratory Support Equipment
LTL	**Low Temperature Loop**
m^3	cubic meter
Max	**Maximum**
Mb	Megabits
Mbps	Megabits-per-seconds
~~MB~~	~~Megabytes~~
~~MBps~~	~~Megabytes-per-second~~
µg	Microgravity
MDK	Middeck
MDL	Middeck Locker
MDLE	Middeck Locker Equivalent
MDM	Multiplexer/Demultiplexer
MELFI	**Minus Eighty Degree Laboratory Freezer**
Mm	**Millimeters**
MmHg	**Millimeters of Mercury**

~~MPLM~~	~~Mini-Pressurized Logistics Module~~
MPLM	**Multi-Purpose Logistics Module**
MTL	Moderate Temperature Loop
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NPTIP	**NASA Payload Training Implementation Plan**
NSTS	**National Space Transportation System**
~~NTIP~~	~~NASA Payload Training Implementation Plan~~
NTSC	National Television Standards Committee
OMS	**Orbital Maneuvering System**
~~P~~	~~Powered~~
PCS	Portable Computer System
PD	Payload Developer
PDL	**Payload Data Library**
PDS	**Payload Data Set**
PFE	Program Furnished Equipment
PGSC	**Payload Ground Support Computer**
pH	**measure of acidity**
~~**PIA**~~	~~**Payload Integration Agreement**~~
PIM	Payload Integration Manager
P/L	Payload
PLBD	Payload Bay Door
POIC	Payload Operation Integration Control
~~POIF~~	~~Payload Operation Integration Function~~
POP	Payload Operations Performance
POP ID	Payload Operations Performance Identifier
PPM	**Parts Per Million**
PROG	**Progress Performance**
PTC	Payload Training Center
PTIM	Payload Training Integration Manager
PRP	**Pressurized Payloads**
PSEA	Payload Support Equipment and Accommodations
PTC	Payload Training Center
~~PTIM~~	~~Payload Training Integration Manager~~
R+	Return plus

ScS	Suitcase Simulator
Sec	**Seconds**
SRB	**Solid Rocket Booster**
SSE	Station Support Equipment
SSMTF	Space Station Man Training Facility
SSP	Space Shuttle Program
SSPF	Space Station Processing Facility
SSTF	Space Station Training Facility
T-	**Time prior to launch minus**
TBC	**To Be Confirmed**
TBD	To Be Determined
TBR	To Be Resolved
TreK	**Telescience Resource Kit**
TSC	Telescience Support Center
TST	**Training Strategy Team**
UF	Utilization Flight
UIP	**Utility Interface Panel**
~~UOF~~	~~User Operations Facility~~
UOP	Utility Outlet Panel
~~UP~~	~~Unpowered~~
USOC	**U.S. Science Operations Center**
~~VES~~	~~Vacuum Exhaust System~~
VBSP	**Video Baseband Signal Processor**
W	Watt(s)

APPENDIX B

ADDENDUM
INCREMENT {INCREMENT NUMBER}

GLOSSARY OF TERMS

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APPENDIX B, ADDENDUM INCREMENT {INCREMENT NUMBER}
GLOSSARY OF TERMS

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APPENDIX C

ADDENDUM
INCREMENT {INCREMENT NUMBER}

OPEN WORK

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APPENDIX C, ADDENDUM INCREMENT {INCREMENT NUMBER}
OPEN WORK

Table C-1 lists ~~the specific items in this Addendum document that are not yet known~~**To Be Determined (TBD) items in this document**. ~~The TBD item is numbered based on the applicable section of the Addendum (where the TBE item is located)~~ **Each item is given a TBD number using the section of the document that contains the item** as the first digit and a consecutive number for the second digit. The TBD ~~is inserted at that location in bold type within brackets (i.e., <TBD 4-1> is the first undetermined item in Section 4 of this Addendum)~~ **number is listed along with the affected section and a description of the item**. As each TBD **item** is **re**solved, the updated text is inserted in place of the TBD in the ~~Addendum~~ **document** and the entry is removed from this table. ~~As new TBE items are assigned or existing TBD items are determined, original TBDs will not be renumbered.~~

TABLE C-1 TO BE DETERMINED ITEMS

~~TBD~~ NUMBER	DESCRIPTION	SECTION	~~TBD~~ ASSIGNEE	DUE DATE	STATUS
~~A.1-1~~	~~SSP Non-Standard Services.~~	~~Addendum 1.3~~	~~Kevin Watts~~	~~12/98~~	~~Open~~
~~B-1~~	~~ISSP Non-Standard Services definition.~~	~~Addendum 1.3~~	~~Kevin Watts~~	~~12/98~~	~~Open~~

Table C-2 lists ~~unresolved~~ To Be Resolved (TBR) issues in this ~~Addendum~~ document. ~~The TBR~~ **Each** ~~issue~~ **item** is ~~numbered based on the applicable~~ **given a TBR number using the** section of the ~~Addendum (where the TBR issue is located)~~ **document that contains the item** as the first digit and a consecutive number for the second digit. The TBR number is ~~inserted at that location in bold type in brackets (i.e., <TBR 4-1> is the first unresolved issue in Section 4 of this Addendum)~~**listed along with the affected section and a description of the item**. As each TBR ~~issue~~ is resolved, the updated text is inserted **in place of the TBR in the document** and the ~~issue~~ **entry** is removed from this table. ~~As new TBR items are assigned or resolved, original TBRs will not be renumbered.~~

TABLE C-2 TO BE RESOLVED ISSUES

~~TBR~~ NUMBER	DESCRIPTION	SECTION	~~TBR~~ ASSIGNEE	DUE DATE	STATUS

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APPENDIX D

ADDENDUM
INCREMENT {INCREMENT NUMBER}

PAYLOAD-SPECIFIC SCHEDULE

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